Rock Products
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# This Plant Is the Product of Much Experience In Crushed Stone Washing

## Bethlehem Mines Corporation's New Operation at Bridgeport, Penn.

THE Bethlehem Mines Corp., a subsidiary of the Bethlehem Steel Corp., has a total of six crushed stone plants, five located in Pennsylvania and one in New Jersey. These plants supply flux stone to the steel company's operations and have been operated for a number of years. In 1921 the company decided to enter the commercial aggregate field in order to dispose of the smaller sizes of stone previously wasted. Accordingly, the Bethlehem, Penn., washing plant was built for the preparation of commercial aggregate. Some pioneer work was also done there on the preparation of stone sand from crushed stone screenings.

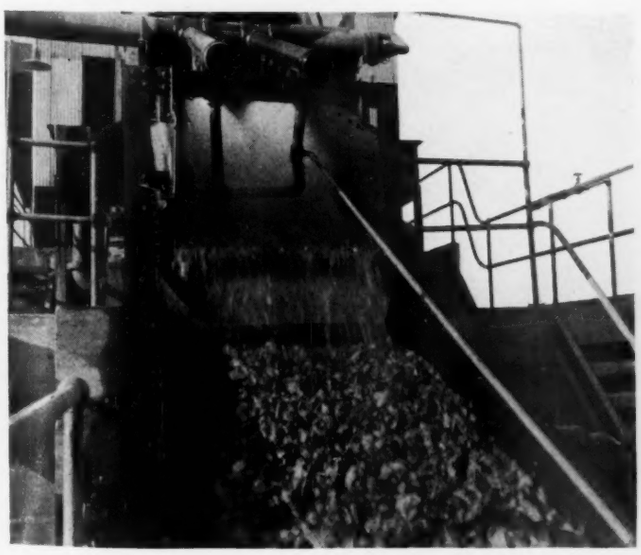
In 1928 the Naginey, Penn., plant was rebuilt and in 1929 a washing plant including log washers was added to make commercial stone.

In 1929-30 the Steelton, Penn., plant was entirely rebuilt to include everything that had been learned in regard to the screening of flux stone and the rescreening and washing of the finer commercial aggregates. These plants have been completely described in ROCK PRODUCTS: the Naginey plant in the July 6, 1929, issue; the Naginey washing plant in the December 21, 1929, issue, and the Steelton plant August 2, 1930.

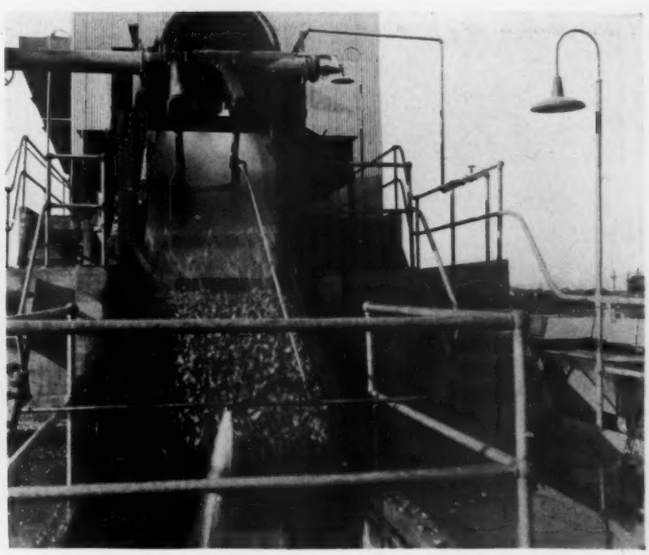
The next plant to be modernized was that at Bridgeport, Penn., located on the Reading railroad about two miles south of Norristown, Penn. This operation has what appears to be a rather complicated flow sheet, but it presents a difficult washing problem and is also arranged to give much greater flexibility than either the Naginey or Steelton plants. The quarry has a red clay overburden which, owing to the extreme unevenness of the surface rock, is hard to strip, so that a considerable portion of this clayey material goes through the plant with the rock.

The plant has been laid out so that stone can be recrushed, rewashed, pulverized, rescreened and washed; in fact, can be sent through almost any conceivable route to insure proper gradation, fineness and washing. The plant is of steel and reinforced concrete construction throughout, and no expense was spared in making it one of the outstanding plants of the year.

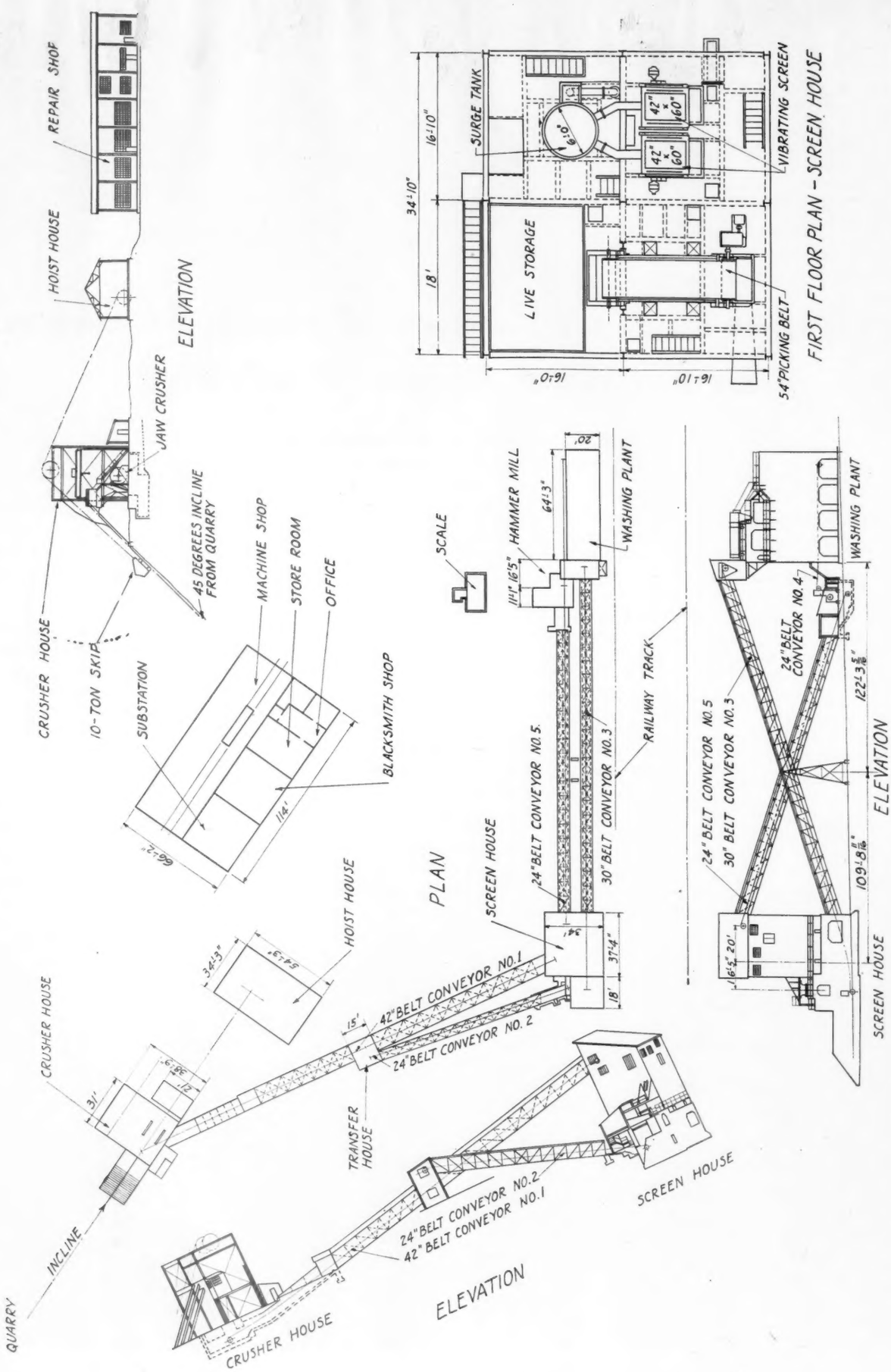
The rock is a hard dolomitic limestone with the ledges of the deposit resting at various steep angles and presenting a very uneven surface which is covered with from 2 to 15 ft. of overburden. Most of this overburden is removed by a ¾-yd. steam shovel and a 1½-yd. electric dragline and loaded to 5-ton trucks. Since the shovel cannot get down into the crevices of the top surface of the rock, hand labor has to be resorted to, and even then considerable of the sticky clay clings to the stone.



*Vibrating screens for washing and sizing crushed stone*



*High pressure jets do the washing*




**General plan and elevation of the Bridgeport, Penn., plant of the Bethlehem Mines Corp.**

That this plant can take such raw material and process it to meet all local and state highway specifications is a credit to its designers and no small achievement in the art of washing stone.

The deposit was acquired by the company about six years ago and a small plant operated until the early part of 1931. The early owners of the pit took out the stone which was easiest to get at and left bodies of rock in the center of the deposit, so that at present the pit appears as a series of deep connected pits; but as the new operation gets under way, quarrying will be more systematic and the several pits worked into a single one. The average height of the quarry face will then be about 80 ft. and will be quarried as a single bench.

*Union Paving Co. plant uses part of crushed stone output for bituminous paving mixes*

### *Large Skips Are a Feature*

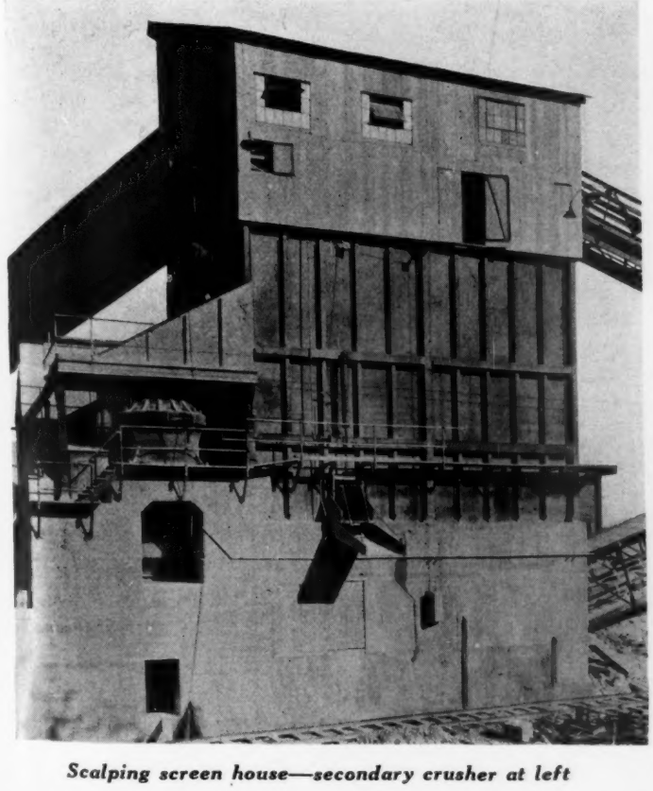
Of the many striking features of this operation the use of large capacity skips and large hoists is one of the most outstanding. At present the crushing plant is served by only one skip, but eventually two balanced skips will be used, the two-drum hoist for this having already been installed. This hoist is one of the largest used in the crushed stone industry. The drums are each 8 ft. in diameter and 4 ft. long, with grooves to accommodate sufficient 1¾-in. wire rope to operate the quarry to a depth of 550 ft., although that depth will not be reached until many years hence. Each skip holds a load of 21,600 lb. of stone.

At first the one skip is being loaded direct by the shovel in order to excavate a pit so that arrangements can be made to load the skips direct from trucks. As soon as this blasting and excavating is completed, the second inclined track will be put down and two skips operated as a balanced set.

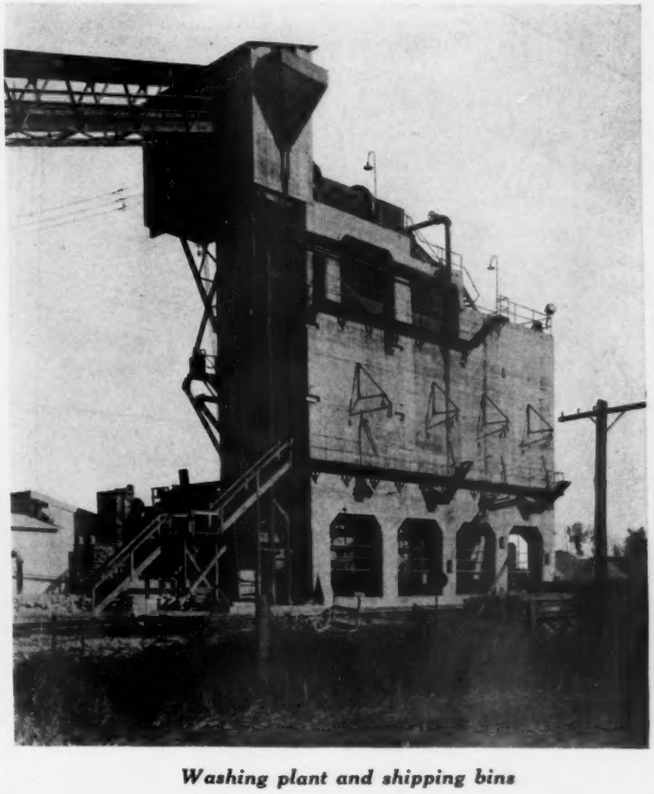
The skips are of novel construction so as to carry out the plans of the engineers for a non-clogging operation throughout. They discharge at a point some distance above the primary jaw crusher, so that a clogging of the skip would be troublesome and slow down the operation; hence these skips were built with a 7-ft. by 7-ft. opening at the top and a bottom area of 6 ft. by 6 ft.

When the quarry operation is in full swing four trucks with 8-yd. bodies will be used for hauling the stone and will dump direct to the skips.

At present there is a steep inclined wagon road from the top down to the quarry floor, but later this will be taken out and an unusual and novel method of handling supplies will be used. A stiff-leg derrick of 50 tons capacity has been mounted on the quarry rim and it will handle all supplies, parts for the new 2½-yd. electric shovel which loads the stone, the trucks themselves, pumps and other equipment, to and from the quarry floor. This



*Scalping screen house—secondary crusher at left*



*Washing plant and shipping bins*

***Conveyors from and to scalping screen plant—to washer and return conveyor for "rice dolomite"***

derrick has a 100-ft. boom and is operated by a 4-drum hoist which is direct-connected to a 112-hp. induction motor equipped with a magnetic brake.

### *Synchronous Motors Used*

An interesting feature of the electrical installation is the more widespread use of synchronous motors than is usually found in such plants. Here four synchronous motors are used: a 150-hp. motor on the 8-in. water pump, a 143-hp. motor on the air compressor, a 250-hp. motor on the hammer mill, and a 200-hp. motor on the secondary gyratory crusher.

These synchronous motors, which have automatic push-button control, are started across the line at full line voltage and have a normal starting torque of 200% of full load and a pull-out torque of 250 to 300%. The larger motors are operated at 4000 volts and the smaller at 440 volts, 3 ph., 60 cyc., current being used throughout. These motors were used because the power company penalizes a load of this kind where the power factor is below 90%. However, by the use of the synchronous motors the power factor for the entire plant is held at unity under normal load conditions, the leading power factor of the synchronous motors correcting the lagging power factors of the induction motors.

The remaining motors of relatively large size are all of the induction type. These include a 150-hp. motor on the primary jaw crusher and a 300-hp. motor on the skip hoist.

### *Belt Conveyors Used Throughout*

Belt conveyors are used throughout for conveying and elevating the material, and comprise seven units, which in the order of their use are as follows:

Conveyor No. 1 (42 in. wide by 271 ft. long) carries stone from the primary jaw crusher to a 48-in. by 120-in. double-deck vibrating scalping screen. This belt, which carries stone up to 6 in. in size, has a capacity of 450 tons per hour and is driven by a 40-hp. induction motor through a gear reducer.

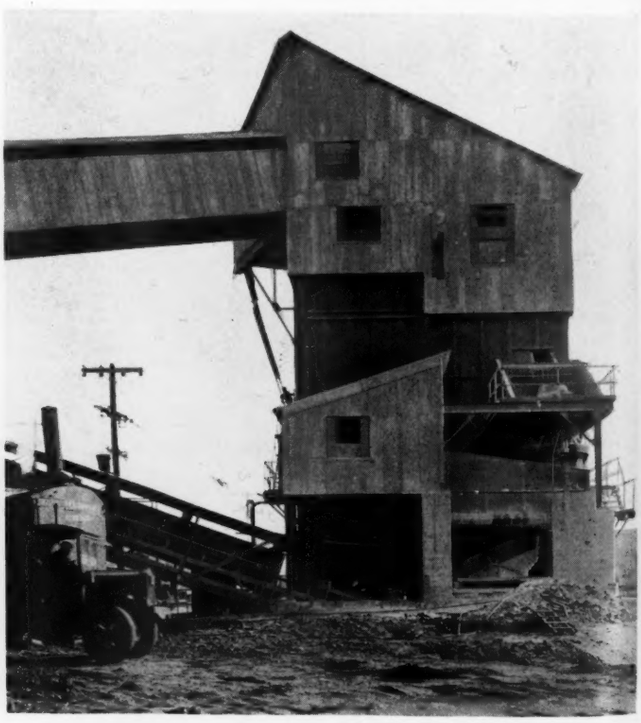
Conveyor No. 2 (24 in. wide by 138 ft. long) returns the oversize which has been screened out from the secondary crusher. This belt is driven by a 10-hp. motor through a gear reduction unit. The screening is done over a 48-in. by 120-in. vibrating screen equipped with 1½-in. mesh cloth.

Conveyor No. 3 (30 in. wide by 256 ft. long) takes the minus 2-in. stone from the storage bin or from the log washers and delivers it to the top of the washing plant. This belt is driven by a 40-hp. induction motor and has a capacity of 350 tons per hour.

Conveyor No. 4 is a 24-in. by 75-ft. horizontal conveyor which carries the material from the storage bins under the washing and screening plant and delivers it to a hammer mill which is used for preparing the rice dolomite. This mill can be used for the recrushing of any of the washed stone below the 2-in. size and could be used on larger stone, but at present 2-in. stone is the largest size produced for commercial aggregate.

Conveyor No. 5 (24-in. wide by 202 ft. long) carries the product of the hammer mill and delivers it to a battery of two 42-in. by 60-in. vibrating screens. It has a capacity of 175 tons per hour and is driven by a 30-hp. motor.

***Another view of scalping screen house***



***Scalping screen house and secondary crusher***

Conveyor No. 6 is a short horizontal 60-in. belt which is used as a picking belt for the removal of any large pieces of clay. It handles flux stone only and receives the oversize from the vibrating scalping screen.

Conveyor No. 7 (24 in. wide by 14½ ft. long) carries away any of the hand-picked clay particles to the edge of the building, where the material is chuted to a cart located alongside the building.

The primary crusher is a 48-in. by 60-in. jaw crusher which is mounted in a steel structure near the top of the head frame of the skip hoist. The skips dump forward into a steel hopper which feeds direct to the crusher opening. The crusher is set to deliver minus 6-in. stone and discharges direct to the 42-in. inclined belt conveyor which delivers the stone to the scalping screen in another building. This belt passes all the way under the jaw crusher, which arrangement was desirable because of the layout of the crusher feed hopper with respect to the skip and quarry. No feeder is used to deliver the stone to the primary crusher nor to deliver the crusher discharge to the belt conveyor.

A 30-ton crane located above the jaw crusher is used for handling repair parts and any large pieces of stone.

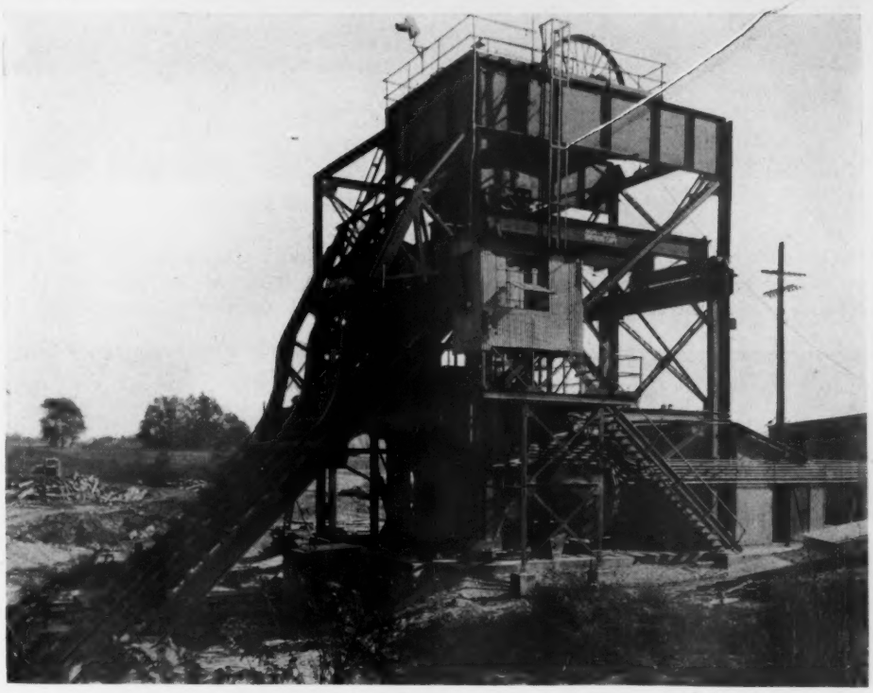
The plant has a capacity of 2000 tons per 10-hr. day and will produce washed commercial stone, unwashed furnace and fluxing stone, a washed and graded stone sand and washed "rice dolomite."

### *Refractory Material Produced*

This plant, like the Steelton plant, produces "rice dolomite." This is a 20-mesh to ⅜-in. product which is free from clay or other impurities and is used in the steel industry as a refractory material to protect the sides and bottoms of the furnaces from the corrosive action of the molten steel. The product itself is a high-grade dolomite and has been thoroughly scrubbed first, then washed and sized in two washing operations. It is classified entirely on vibrating screens.

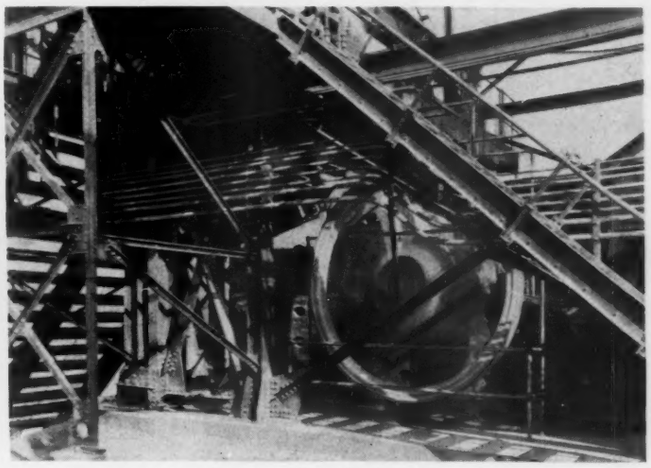
Stone sand is produced by taking the previously scrubbed crushed stone (minus 2 in.) and after screening out the larger sizes over a double-deck vibrating screen the remaining minus ¼-in. product passes to a collecting pan which makes a rough gradation. The overflow from the collecting pan goes to a steel surge tank from which the material

*Skip hoist from quarry—washing and screening plant in background*

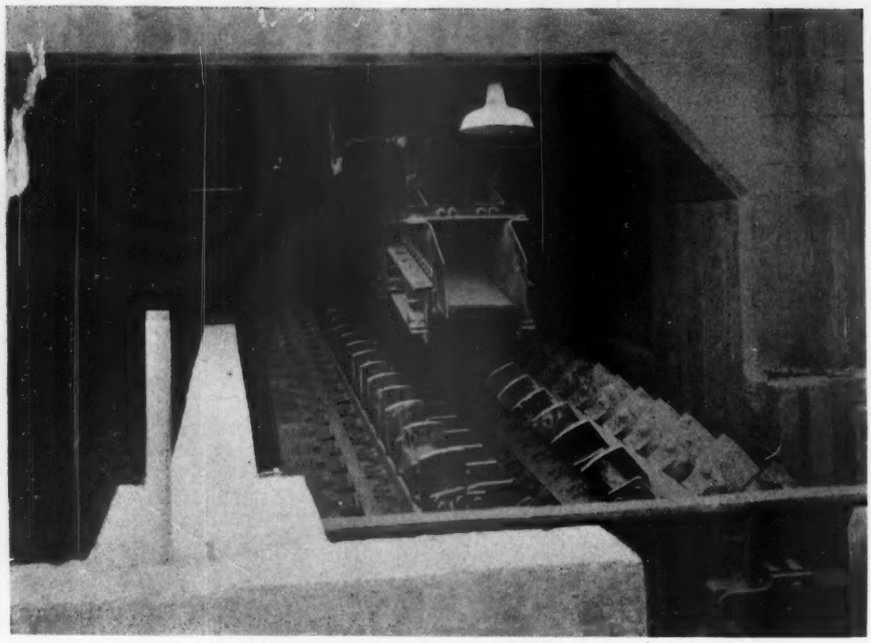


*Close-up view of skip headframe and primary crushing plant*

*Skip dumping to crusher*



*Primary jaw crusher*



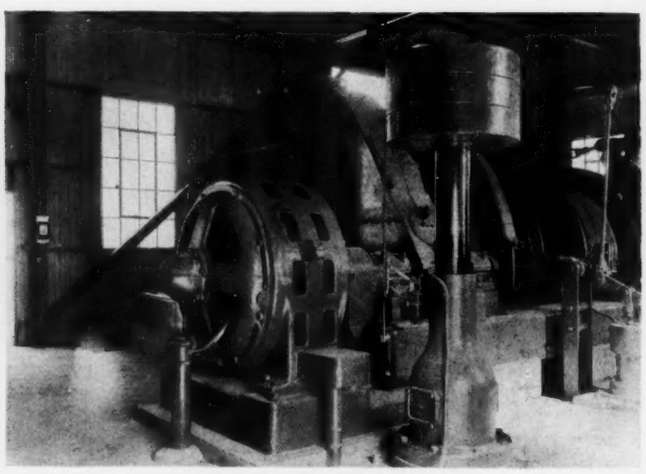
*Log washers under crushed stone bins*

(water with some fine sand) can be wasted or pumped to vibrating screens in the rice dolomite plant. The coarser material in the collecting pan or cone passes to a drag classifier where it is met by the minus ¼-in. stone from the dewatering screen beyond the scrubber. This drag discharges to bins below while the overflow goes to waste.

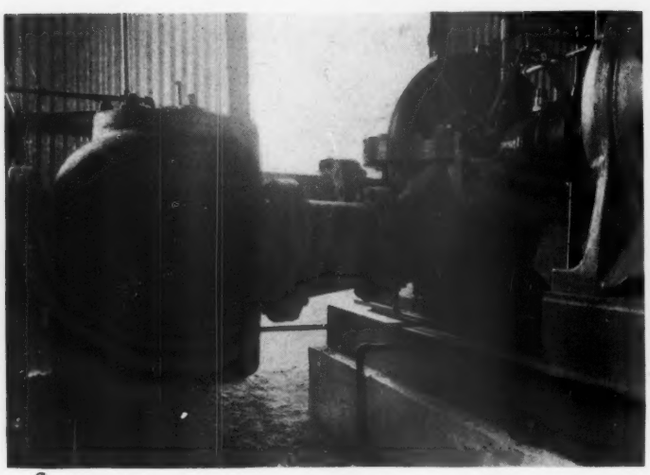
The rotary scrubber is the same as the one used at Steelton, but it will be noted that a set of 24-ft. double log washers have been placed ahead of it. However, the log washers are intended to be used only when the stone coming from the preliminary screening plant is exceptionally dirty, as during normal operations the rotary scrubber has been found to be adequate. Ballast can be sent through the log washers also. Incidentally, at the Naginey plant the commercial stone is scrubbed in log washers only.

The rotary scrubber, which was designed by the engineering staff of Bethlehem Mines Corp., is 6 ft. in diameter by 20 ft. long, requires 50 hp. to operate, and has a capacity of 1000 tons per 10 hr. This tonnage is not the ultimate capacity, as most of the plant's total output of 2000 tons per 10 hr. goes to the production of furnace stone which is not washed. The rotary scrubber has a 6-ft. overhang of ¼-in. wire cloth which acts as a dewatering screen. The scrubber rotates at a speed of 13 r.p.m. and is driven through an enclosed train of gears. Lifter plates or baffles are mounted on the interior of the drum.

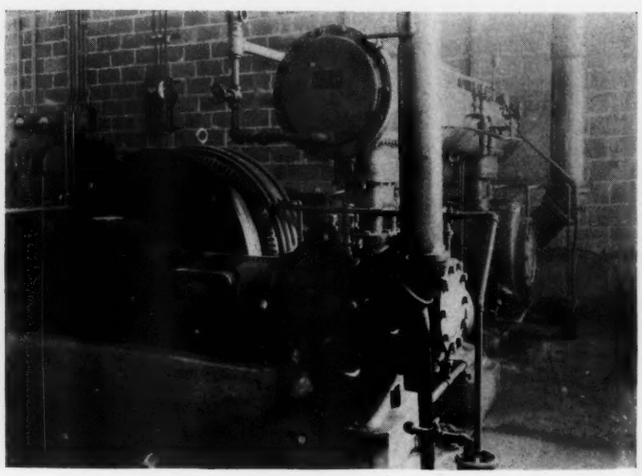
*Derrick hoist motor installation*



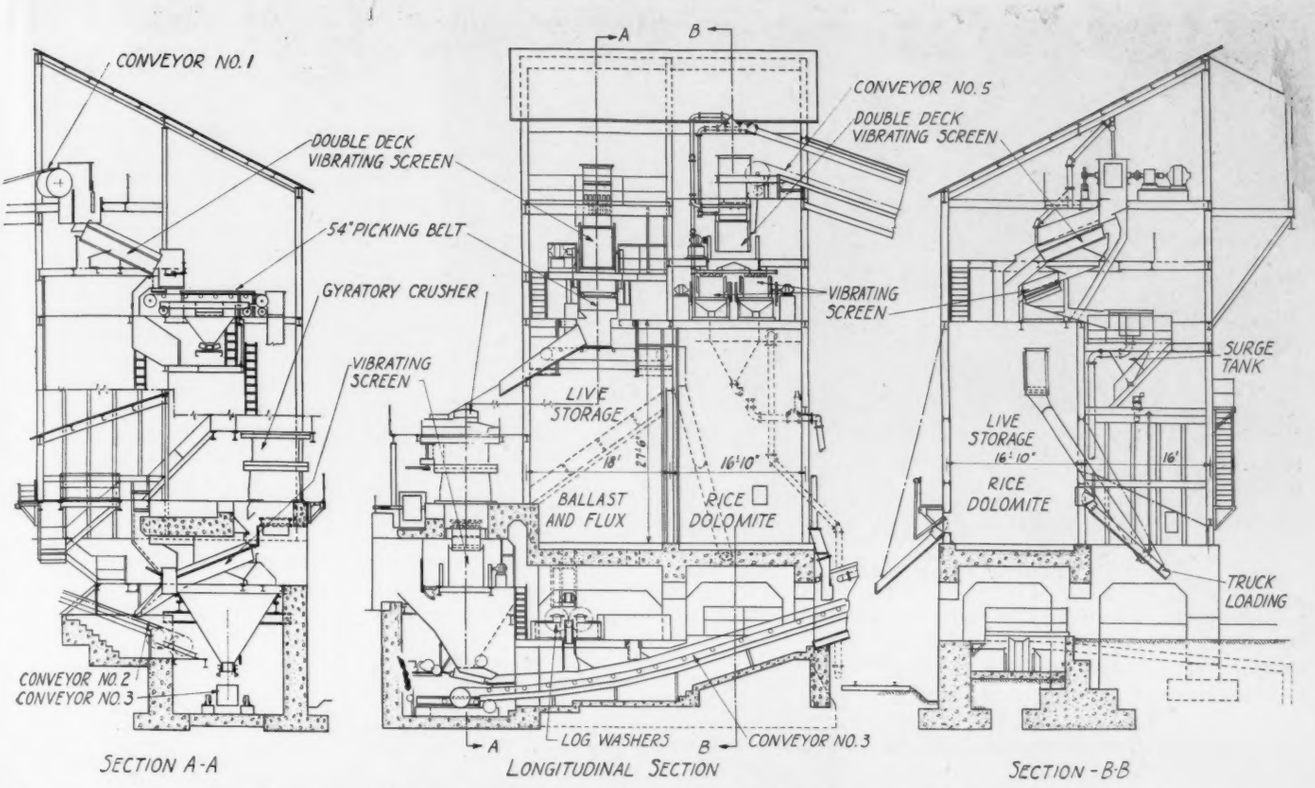
*Skip hoist motor installation*



*Pump for quarry drainage and wash water*



*Air compressor and synchronous motor drive*




***Details of screening and washing plant of Bethlehem Mines Corp., at Bridgeport, Penn.***

The scrubber discharges to 48-in. by 120-in. double-deck vibrating screens which separate out the commercial sized stone to bins below.

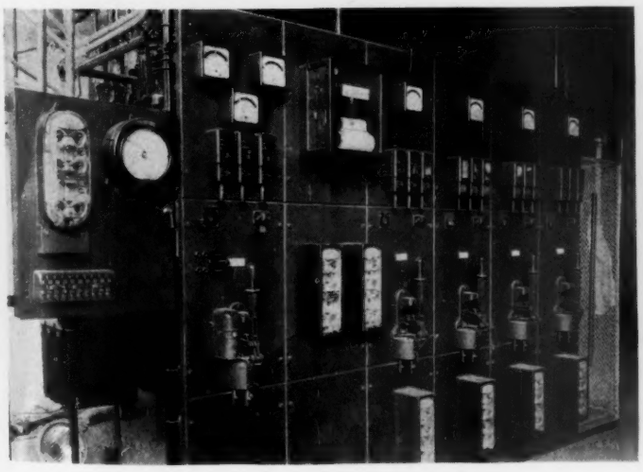
This screening operation shows an interesting development resulting from the experience of the company engineers in the construction of the three washing plants. Both Bethlehem and Hanover operations, the first two plants built, had revolving screens following the log washer scrubbers. The third plant built, Steelton, also had a rotary screen following the rotary scrubber; but in this, the latest plant, the builders use vibrating screens following the scrubbing operations.

One feature which contributes greatly to the successful removal of the sticky clay adhering to the stone is that the use of home-made, inefficient and, in many cases, almost useless water sprays has been done away with entirely and a patented nozzle spray used instead. These sprays are mounted over each of the washing screens. Over the 48-in. by 120-in. vibrating screen following the scrubber are eight 2-in. sprays attached to two 4-in. header pipes which are in turn supplied from a 6-in. supply line.

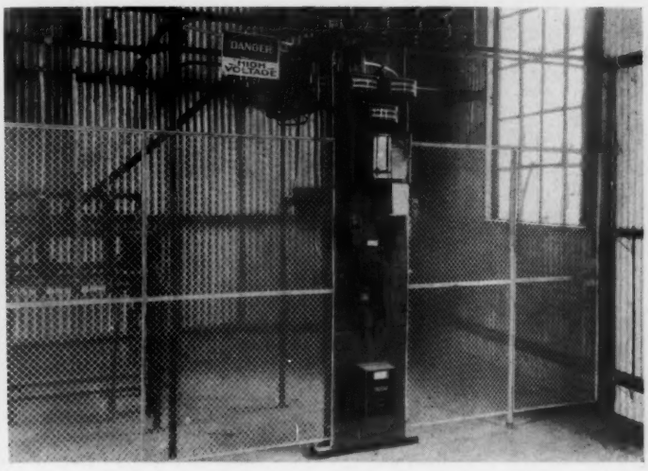
The sprays deliver 1200 gal. of water per min. at high pressure and, what is still more important, deliver the water uniformly over the entire screen area. These small but extremely high pressure jets of water have a sharp scrubbing action that must not be overlooked. The pump which supplies this water delivers a total of 1500 gal. per min. against a total head of 242 ft. As the pump is located some 1200 ft. from the screens, delivers through an 8-in. line, and is at an elevation of roughly 140 ft. below the outlets, there is a nozzle pressure equivalent to about 100 ft. of head. Similar but smaller sprays are used on the vibrating screens which prepare the rice dolomite.

A fluid meter has been installed in the water line to the washing plant so that the operator has a guide as to the amount of water being used.

The overflow from the sand settling devices flows to a 6-in. centrifugal pump located near the rotary scrubber, and this pump delivers water to the interior of the rotary scrubber through a pipe entering the head of the scrubber. In this manner the clean water from the quarry is used for the



***Control and meter panel in compressor room***




***Skip-hoist motor control panel***

*Electric shovel loading direct to skip*

washing of the cleaner products and at the same time the extra cost of lifting all of the water to an unnecessary height, as would be the case were all the plant water requirements to come from the quarry, is eliminated. The rotary scrubber receives 600 gal. of water per min.

### *Flow of Material*

From the primary jaw crusher the minus 6-in. stone falls to conveyor No. 1, where it is elevated and conveyed to a 48-in. by 120-in. double-deck scalping screen. This screen makes three sizes: minus 1½-in., 1½-in. to 2¼-in., and plus 2¼-in. The plus 2¼-in. to 6-in. stone passes to conveyor No. 6, where any large pieces of clay or other foreign matter are removed by hand. This conveyor discharges to a steel bin holding the flux stone or to the gyratory reduction crusher.

The reduction crusher discharges to a 48-in. by 120-in., single-deck, vibrating screen from which the minus 1½-in. size falls to conveyor No. 3 and is delivered to the washing plant. The oversize from this vibrating screen falls to conveyor No. 2, which returns it to the main belt leading from the primary crusher.

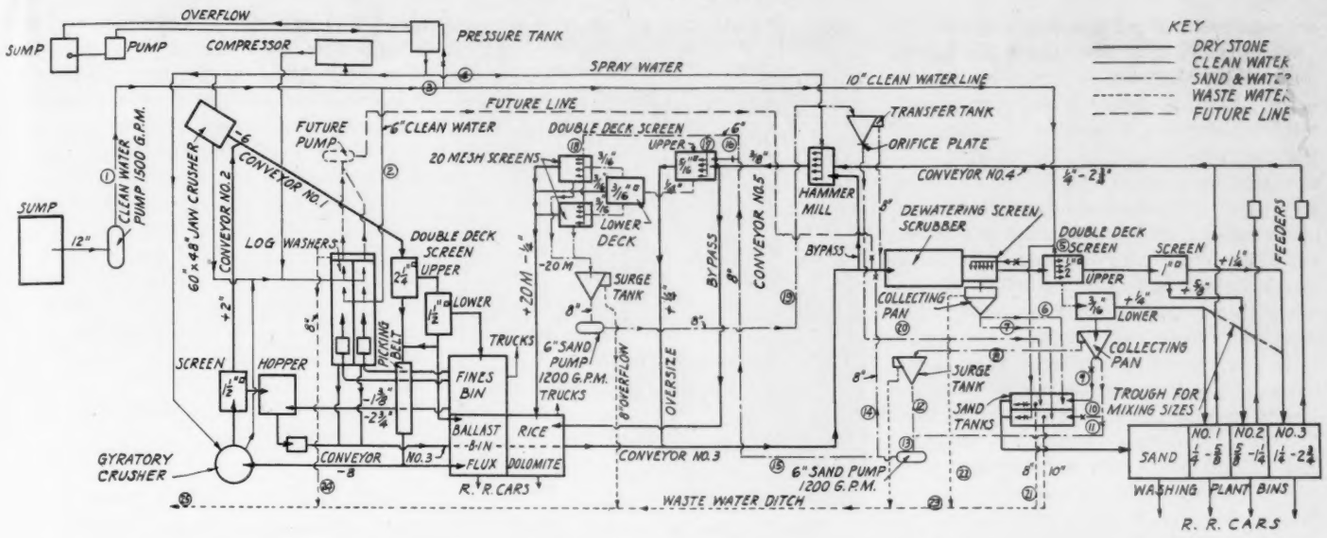
The minus 1½-in. material from the scalping screen falls to a surge bin from which it flows to conveyor No. 3 supplying the rotary scrubber. The plus 1½-in. to 2¼-in. stone falls to the ballast bin, also of steel construction. These two sizes of stone can, if desired, be passed to the log washers or can be fed to conveyor No. 3 serving the rotary scrubber. The overflow from the log washers goes to waste. The scrubber produces a plus ¼-in. material (¼-in. to 2-in.) and a minus ¼-in. material, the latter product being the source of the stone sand previously referred to.

The oversize from the dewatering screen passes to a 48-in. by 120-in., double-deck vibrating screen which produces a plus ½-in. to minus 2-in. material, a plus ¼-in. to minus ½-in., and a minus ¼-in. product. The latter goes to the stone sand recovery system. The ¼-in. to ½-in. stone goes to concrete bins below.

*Quarry showing derrick installation for handling supplies and equipment*

The plus ½-in. to 2-in. size falls to a single-deck, 48-in. by 102-in. vibrating screen, the ½-in. to 1-in. and the 1-in. to 2-in. sizes

*General view of the quarry (hoist house at extreme right)*

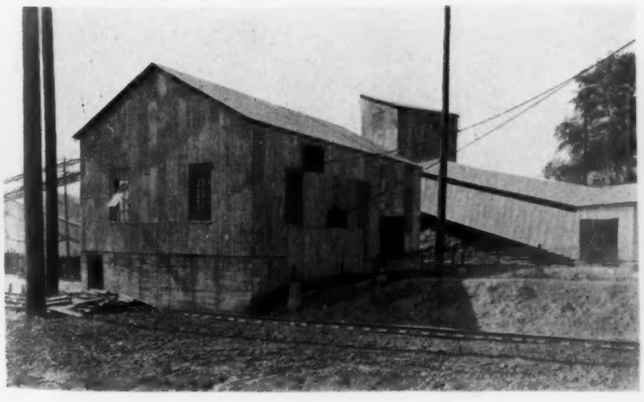



| WATER GALLONS PER MINUTE | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OPERATION / LINE NUMBER | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| WASHING PLANT | 1500 | 0 | 1500 | 1325 | 1295 | 200 | 200 | 895 | 200 | 200 | 0 | 895 | 895 | 895 | 0 | – | – | – | 0 | 0 | 410 | 505 | 1325 | 175 | 1500 |
| WASHING PLANT & LOG WASHER | 1600 | 325 | 1275 | 1100 | 1070 | 200 | 200 | 670 | 200 | 200 | 0 | 670 | 670 | 670 | 0 | – | – | – | 0 | 0 | 410 | 280 | 1100 | 500 | 1600 |
| WASHING PLANT & LOG WASHER – RICE DOLOMITE PLANT | 1600 | 325 | 1275 | 1100 | 1070 | 0 | 400 | 870 | 200 | 0 | 0 | 870 | 870 | 0 | 870 | 250 | 250 | 370 | 870 | 200 | 410 | 280 | 1100 | 500 | 1600 |
| WASHING PLANT & RICE DOLOMITE PLANT | 1500 | 0 | 1500 | 1325 | 1295 | 0 | 400 | 1095 | 200 | 0 | 0 | 1095 | 1095 | 0 | 1095 | 250 | 365 | 480 | 1095 | 200 | 410 | 505 | 1325 | 175 | 1500 |
| WASHING PLANT, LOG WASHER, RICE DOLOMITE PLANT & SAND LINE | 1600 | 325 | 1275 | 1100 | 1070 | 0 | 400 | 670 | 0 | 0 | 400 | 670 | 1070 | 0 | 1070 | 250 | 350 | 470 | 1070 | 200 | 210 | 480 | 1100 | 500 | 1600 |
| WASHING PLANT, RICE DOLOMITE PLANT SAND LINE | 1500 | 0 | 1500 | 1325 | 1295 | 0 | 400 | 895 | 0 | 0 | 400 | 895 | 1295 | 0 | 1295 | 250 | 455 | 590 | 1295 | 200 | 210 | 705 | 1325 | 175 | 1500 |

***Flow sheet of the Bridgeport plant of the Bethlehem Mines Corp.***

***Dragline excavator for stripping***

***Quarry detail showing type of drill used***



***Skip hoist housing***

***Shop, office and compressor house***

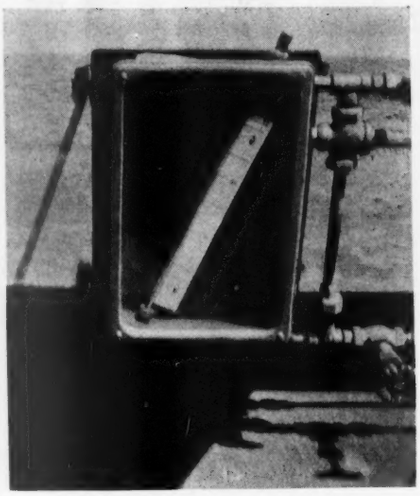
are separated out and fall to bin below.

Stone from any of the concrete bins below the washing plant can be drawn on to conveyor No. 4 and carried to the hammer mill for the production of smaller sizes, including the "rice dolomite." The hammer mill discharges to conveyor No. 5, which elevates and conveys the recrushed material to the top of the building housing the flux stone screens. Here the crude rice dolomite falls to a double-deck 42-in. by 60-in. vibrating screen, where three sizes are secured: a minus 0.10-in., a minus ⅜-in. to plus 0.10-in., and a plus ⅜-in. size. The latter product is returned to conveyor No. 3, serving the rotary scrubber. The intermediate size (minus ⅜-in. to plus 0.10-in.) is the rice dolomite and it falls to bins. The minus 0.10-in. material passes to two single-deck vibrating screens (42-in. by 60-in.), the oversize from which passes to the rice dolomite bins. The minus 0.03-in. material passing through these screens flows to a surge tank and is pumped to the washing plant. The screening of the rice dolomite is all done wet, water being delivered to all of the vibrating screens through patented spray nozzles.

### General

Primary drilling in the quarry is done by a 6-in. electric well drill which is provided with a ¾-in. wire rope. This rope was said to drill 2500 ft. to 3000 ft. of hole before having to be replaced. The wire rope apparently does not have any great advantage over manila rope, nor does the manila rope have any advantage over the wire rope; however, the wire rope installation is cheaper as to first cost, it was said.

Air is supplied by a 17-in. by 10-in. by 12-in. compressor which is direct-connected to a 143-hp. synchronous motor. The compressor unit is located in one wing of the concrete block building which houses the machine shop, storeroom and office.



***Fluid meter at washing plant***

Considerable water finds its way into the quarry, and this water is the source of the washing plant supply. A reservoir holding about 500,000 gal. of water has been excavated in the quarry floor so that there may be an ample supply, since the plant requires about 1500 gal. of water per min. and the natural flow from the pit is slightly less than that. Alongside the pond is mounted the pump house, in which is mounted an 8-in. centrifugal pump which is direct-connected to a 150-hp. synchronous motor. The pump operates at 1200 r.p.m. and delivers 1500 gal. per min. against a total head of 242 ft.

Adjoining the Bridgeport plant of the Bethlehem Mines Corp. is the asphalt mixing plant of the Union Paving Co. of Philadelphia. A double-page insert showing an airplane view of this operation was published in the January 9, 1932, issue of Rock Products.

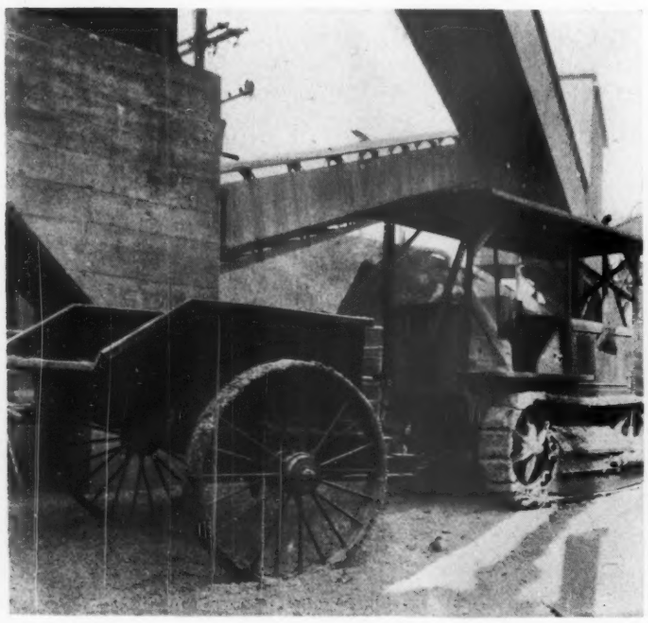
The offices of the Bethlehem Mines Corp. are at Bethlehem, Penn.

## Demand for Scrap Mica Increases in Importance

SCRAP MICA, instead of the sheet variety, is finding a larger sale on the present market according to the *Asheville* (N. C.) *Citizen*. Several Macon county, Ga., mines are now being worked for the scrap mica left behind when the sheet mica was considered first quality on the market.

MOTOR SCHEDULE

| Location | HP. | Type of drive | Remarks |
|---|---|---|---|
| Primary jaw crusher | 150 | 32-in. leather belt | Induction motor |
| Secondary jaw crusher | 200 | 24-in. leather belt | Synchronous motor |
| Skip hoist | 300 | Enclosed gears | Induction motor |
| Water pump (quarry) | 150 | Direct-connected | Synchronous motor |
| Belt conveyor No. 1 | 40 | Gear reducers | Induction motor |
| Belt conveyor No. 2 | 10 | Gear reducers | Induction motor |
| Belt conveyor No. 3 | 40 | Gear reducers | Induction motor |
| Belt conveyor No. 4 | 5 | Gear reducers | Induction motor |
| Belt conveyor No. 5 | 30 | Gear reducers | Induction motor |
| Belt conveyor No. 6 | 5 | Gear reducers | Induction motor |
| Belt conveyor No. 7 | 3 | Gear reducers | Induction motor |
| Hammer mill | 250 | Direct-connected | Synchronous motor |
| Air compressor | 143 | Direct-connected | Synchronous motor |
| Rotary scrubber | 50 | Enclosed gears | Induction motor |
| Two sand drags | 10 | | |
| Return water to scrubbers | 25 | Direct-connected | Induction motor |



***Cart and tractor for handling waste about the plant***

***Trucks for quarry handling of stone to skips***

# Broad Field of Interests Covered at American Concrete Institute Meeting

TO CEMENT manufacturers, the report on studies of low-heat cements carried out to develop a cement for Hoover dam was the most interesting part of the meeting of the American Concrete Institute, held in Chicago February 21-24.

These special cements were developed for a specific requirement—mass concrete. Publicity given this investigation has led some to believe that special cements should be furnished for many other types of jobs. While this investigation may be expected to have a bearing on the future manufacture of cement, it would be folly to have manufacturers called upon to supply a large number of cements having only slightly differing characteristics.

**Prof. Raymond E. Davis,** who was in charge of this investigation, in cooperation with the U. S. Bureau of Reclamation and a number of cement companies, reported that tricalcium aluminate ($C_3A$) liberates most heat per unit weight of the major compounds largely during the early stage of hardening. Tricalcium silicate ($C_3S$) is next in heat generation, acting chiefly during the secondary hardening, within the first day or week after hardening begins. Dicalcium silicate ($C_2S$) and tetracalcium alumino-ferrite ($C_4AF$) produce the least heat of hydration in long continued action. Increased loss on ignition decreases the heat of hydration. Increased water-cement ratio increases the heat generated.

Other facts brought out were that ratio of strength to heat generated is greater with extreme fineness, low tricalcium aluminate and high dicalcium silicate content; that early strength depends principally on tricalcium silicate, while the gain in strength after the first week depends usually on dicalcium silicate (cement high in the later compound shows large gain in strength after 28 days); increased fineness increases strength at late as well as early ages, nearly in proportion to specific surface; and, within the usual range of fineness, the finer the cement the less water is required to produce a concrete of fixed consistency (specific surface is considered the most satisfactory measure of cement fineness).

**Arthur Ruettgers** and **R. F. Blanks** of the Denver laboratory of the Bureau of Reclamation gave results on seven tests of commercial cements, selected after investigation of a large number of cements at the University of California. Among conclusions reported from these tests were: High or low heat of hydration is in general indicative of high or low compressive strength; early strengths with mass curing are considerably higher than for standard curing, but at later dates the reverse is more generally true; a consistent gain in strength occurs over a long period of time with low-heat cements, compared with high-early-strength development and later slow gain of higher-heat cements.

### *Aggregates*

Thermal properties of mass concrete are largely dependent on the nature of the stone; quartz and limestone have nearly twice the rate of heat transfer of basalt. The sand being used in Hoover dam is quartz, while the larger material is limestone mixed with granite, basalt and quartzite. These data were presented by **C. S. Ripon** and **L. J. Snyder** of the Denver laboratory of the Bureau of Reclamation.

### *Accelerated Test for Field Concrete Control*

An 8-hr. accelerated test for field concrete control was explained by **O. G. Patch,** Boulder City, Nev., staff of the Bureau of Reclamation. Tests over a 30-day period, checked against 7- and 28-day strengths, showed average strengths for the 8-hr. concrete of 1000 lb. per sq. in., for the 7-day concrete of 3000 lb. and 4000 lb. at 28 days.

The 8-hr. accelerated test is made by curing seven hours in a standard quantity of hot water, starting at a standard temperature in a calibrated, insulated vat. The hot water curing begins ½-hr. after concrete is discharged from the mixer. After 7-hr. hot curing the cylinder is allowed to cool one hour in a 70 deg. moist room, when it is broken.

Mr. Patch concludes that "While this method of concrete control is still in its infancy, the results so far indicate a prophetic accuracy practically as great as that obtained from the 7-day tests."

### *Relation Between Quality and Economy of Concrete*

In his paper, "Relation Between Quality and Economy of Concrete," **Inge Lyse,** research assistant professor of engineering materials, Lehigh University, showed how a rational economic study is possible by using the constant water content theory; also how such factors as price of cement and aggregate, strength, quality of cement and gradation of aggregate affect the economy of concrete mixes.

No marked difference was found in the cost of concrete due to variation in the strength of cement. A slight increase in richness obtained at very small cost would easily offset all differences due to the strength qualities of the cement. It was found that a change in price of the aggregate has a greater effect upon economy of the mix than has a corresponding change in the price of cement; that the effect of the price of aggregate on the economy of the mix is more prominent for lean than rich mixes. Regardless of the prices of cement and aggregates, the lowest cost per unit of strength was obtained using high strength concrete.

The study of Professor Lyse only covered those mixes in most general use. In discussion, **T. C. Powers** showed the results of investigation into richer mix, higher strength concrete than that included in the report of Professor Lyse. From this discussion it was apparent that the increase in economy with increase in strength continues only to a certain optimum point beyond which further increase in strength is at a sacrifice in economy.

### *Effect of Vibration on Concrete Costs*

While the subject of vibration was given much consideration, that part of interest to rock products producers was covered in a paper by **T. C. Powers,** associate engineer, research laboratory, Portland Cement Association.

Strength of concrete follows the water-cement ratio regardless of the method of placement. In other words, with the same ratio of water to cement there will be no difference in strength. But satisfactory placement by vibration can be obtained with much stiffer consistencies, thus making possible lower water-cement ratios—higher strengths—for the same cement content, or more economical mixture for the same water-cement ratio.

### *Fireproof Homes*

As a possible early market of importance, a paper, "Technological Developments in Fireproof Concrete Dwellings," by **W. D. M. Allan,** and read by R. E. Copeland, cement products bureau, Portland Cement Association, created much interest.

Concrete dwellings have been the subject of much study over a long period of time, though there is probably greater interest and study of the problem at this time than during any preceding period. Study has included both monolithic and precast construction. From present developments it is believed that greatest economy will obtain with the use of precast units in walls and a combination of precast and monolithic floor construction.

### *Officers Reelected*

The following officers were reelected: President, S. H. Hollister, professor, structural engineering, Purdue University; vice-president, P. H. Bates, chief, clay and silicate products division, Bureau of Standards; and treasurer, Harvey Whipple. The following directors were reelected: J. C. Pearson, director of research, Lehigh Portland Cement Co.; J. J. Early, architectural sculptor; and F. R. McMillan, director of research, Portland Cement Association.

# How Railroads and Commercial Aggregate Producers Cooperate in Kansas

## Truck Competition Being Met on Sound Lines: Elements of Cost Being Developed and Demonstrated

By John H. Ruckman
Consulting Engineer, Topeka, Kan.

THE PRODUCTION of mineral aggregates during the last two years has been at best a nerve wracking occupation. If any one has found the transportation of the aggregate to the job any less nerve wracking, the chances are that he has kept no books. If production, transportation, or estimating in Kansas have now been placed on a more stable basis, the reason is, in part at least, to be found in the Kansas Contact Committee on Special Rates.

This committee is composed of representative contractors and aggregate men. The present officers are: M. W. Watson (president of the Kansas Contractors Association), chairman; Otto Kuehne, Jr. (Kansas Sand Co.), vice-chairman; Carl M. Hise (secretary of the Sunflower Sand and Gravel Association), secretary; and J. W. Ballard (secretary of the Kansas Contractors Associaton), assistant secretary. Other members of the committee are F. H. Gades (Lawrence Sand and Gravel Co.), W. E. Seright (Independent Sand Co.), Scott Jones (Interurban Chat Co.), A. L. Cook (contractor), George Collins (contractor), H. N. Richardson (Consumers Sand Co.) and A. A. Wild (traffic counsel for the Kansas Contractors Association).

The committee's duties are simple but nevertheless, somewhat unusual. Its function is to examine the conditions surrounding every important contract, making a field check, if necessary, to determine whether or not the existing scale of railroad freight rates is such as will permit the railroads to compete for the business against truck-hauled materials. If not they inform the interested carrier of their findings and recommend a rate which in their opinion will permit the railroads an opportunity to participate. The carrier then takes the matter up with the Western Trunk Line Committee. The carriers have agreed to request no special rates unless approved by the Contact Committee; and we thus have a somewhat unusual situation in which a committee of shippers is acting as a confidential advisor to the railroads in the matter of rates, and acting in the interests of the railroads. Curiously enough it is also acting in the interest of the railroads' competitors, though the latter may not realize this fact.

The events leading up to this situation began with the stock market collapse in 1929, but the situation did not become serious until the fall of 1930, when the previous year's appropriations for new construction, both public and private, were expended. During 1931 matters did not improve and in the fall of 1932 some definite action became necessary.

Since June 26, 1930 freight rates on aggregates in Kansas and the adjacent states to the south and east have been determined by the Western Trunk Line Tariff 210. The interstate rates set up in this case are shown numerically in Table 1 and graphically in Fig. 1. Since then they have been modified by the so-called emergency surcharge of 6c per ton which has been regularly added on intrastate shipments. Up to 60 miles this rate, as modified, amounts to very nearly 50c plus 0.6c per ton-mile.

At the time when this rate was adopted truck owners figured their cost of operation at from 2c to 3c per ton-mile empty and loaded, or for the average aggregate job where no return is possible, 5c per ton-mile. Inasmuch as there is generally some haul after unloading from freight cars and unloading charges as well, there was under these conditions a penalty of about 30c a ton, which had to be added to the railroad rate where this type of shipment was used. On this basis and with truckage at 5c per ton-mile the longest economical truck haul was about 20 miles and the railroads were able to obtain some business at 15 miles. Rates were stable, and known to all bidders on all contracts and both railroads and truckmen were making money.

### *Truck Haulers Disorganized*

As the severity of the depression increased, the picture changed. Truck owners began to offer their trucks at almost any figure to cut down idle time and to enable them to hold their organizations together, while at the same time farmers, and city mechanics forced out of employment went into truck transportation, financing themselves as best they could. As a result prices dropped till they approximated 2.15c per ton mile, of actual haul. The Kansas State Highway Commission recognized $1.35 per hour as the going rate for a 3-ton truck and driver (about 2.15 per ton mile) and actual quotations corresponded to the dotted line on Fig. 1. Rates for haul to the job after unloading also fell somewhat, but the differential in favor of truck as against rail dropped only to 20c a ton. Under the W. T. L. 210 rate this gave truck haulage an advantage on most jobs up to 50 miles, and under some circumstances, notably where hand labor was specified for unloading freight cars, the contractors preferred truck hauling up to 55 and even 60 miles.

The principal shipping points for sand, gravel and chats in Kansas are shown in Fig. 2. If a radius of 50 miles is struck from each shipping point the resulting area (Fig. 2) includes more than half the area of the state, about four-fifths of the popula-

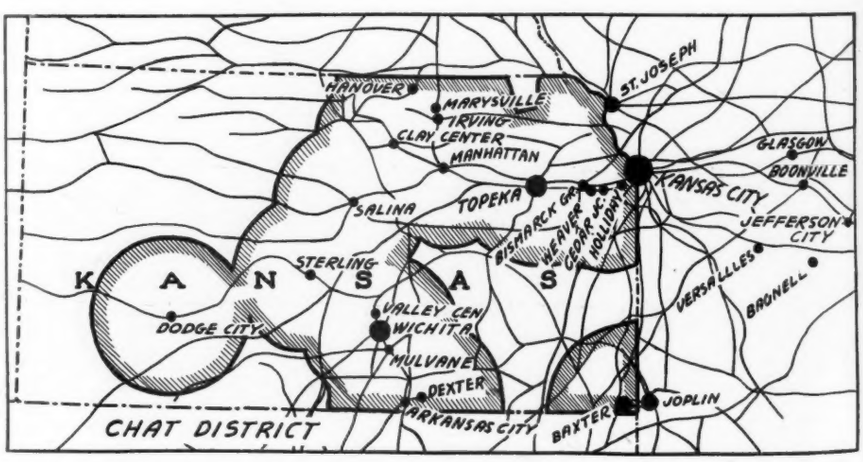



*Fig. 2. Map of Kansas showing locations of commercial aggregate plants*

tion and nine-tenths of the wealth. The railroads were thus in danger of losing almost the entire traffic.

### *Early Railway Efforts to Meet Truck Competition*

In an effort to retain this business the railroad freight agents began to request special rates where large or important jobs were at stake. Naturally, the Public Service Commission, believing that these special rates would result in closer competition and thus in a saving to the taxpayers, granted practically all of those requested. But once the practice was established it proved hard to control. A contractor or gravel producer or both together would inform a freight agent that his railroad could get the haul of material for a given job if a certain rate could be made, but that otherwise another concern would get the order and would deliver by truck. The railroad officials would promise to apply for that rate, and the producer and his contractor friend would go to the letting with the job practically sewed up through knowledge of the proposed rate.

Of course, competitors soon got to work and they often applied to different railroads. Not only did they use truck haulage as a threat, but also roadside pits which proved a very serious matter in connection with "blotter type" road construction, since the interpretation of the inspection requirements of the state highway department for this type was so obscure as to leave doubt in the minds of both contractors and producers as to just what would be accepted. It was not long before a new special rate was added for each new job. Railroads sent applications without consulting the Western Trunk Line Committee, and applications were frequently approved after the letting, regarding the terms of which all but one or two bidders had been entirely ignorant when the letting took place. Needless to say such a situation saved the taxpayers very little and threatened the aggregate industry and the construction work with complete disorganization.

### *Joint Action to Avoid Ruinous Competition*

During October, 1932, matters finally reached a point where action was imperative. Accordingly a meeting was called at Topeka to find a more satisfactory method for handling the situation. This meeting was attended by representative contractors, aggregate men and representatives of the railroads, while the Kansas Public Service Commission was represented by I. C. Peterson. As a result of this meeting the Kansas Contact Committee on Special Rates was formed to advise the railroads and the Public Service Commission as to the actual rates necessary on each job to place the railroads in a competitive position with truck haulers.

Under this arrangement special rates are still granted but they are granted under conditions which make for more orderly marketing. They are granted only where necessary. The applications are filed, in ample time and the rates are published before the letting takes place. The aggregate men and contractors are once more able to make up intelligent bids and the taxpayers get the full advantage of every rate cut.

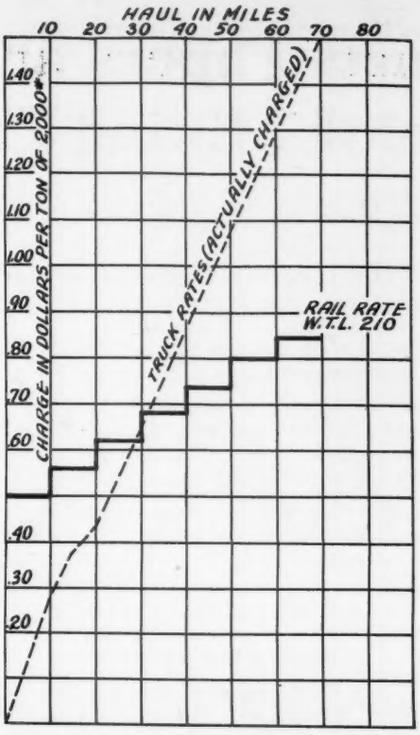



***Fig. 1. Chart showing limits of economic truck hauls***

### *Really Helps Trucker Too*

As was stated earlier, the work of this committee is serving the trucker also, though he may not realize it. The curve of truck charges shown in Fig. 1, which does not differ materially from the official rate of $1.35 for a truck and driver handling a 3-ton load, represents haulage at 2.15c per ton-mile, with no return load. For a 2-yd. truck this means 3.24c per truck-mile. The drivers' wages alone amount to 1c per mile, gasoline and oil will be 1c, tires 0.7c and if truck and body last for 70,000 miles the depreciation will amount to 0.9c, a total of 3.6c without counting licenses, mileage taxes, insurance, interest and repairs. It is clear that the 2-yd. truck men are operating at less than direct mileage costs, let alone overhead.

Larger trucks are a little more economical in operation. They, however, are generally owned and operated by men who expect interest on the investment and some profit. At present the truck-owners are merely donating some of their money or time for the privilege of being at work. Many free lance truckers are happy to make even a part of the 35c wage. In the long run, however, the competing railroads and the truck dealers are obliged to stand the loss. An increase in the truck rate to about 3c per ton-mile would be a great help to everyone. It would not affect the cost of transportation under 10 miles, and would increase it only 17c per ton at 20 miles. The truck haul limit would be about 30 miles.

Just what the upshot is to be it is hard to predict. Legislation may increase taxes on trucks, and yet the truckers, who seem to be running now at a loss, may for some months absorb the additional expense. The state highway commission in some cases specified that railroad cars must be unloaded by hand and that a certain number of drivers must be local men. Where hand unloading is specified, handling charges are increased. The truck dealers have lost considerable money and may take a hand by refusing to sell equipment under conditions where it can not pay for itself, and on the other hand each new truck model, is faster and more economical; while we hear rumors of cheaper tires and gas.

No committee can expect to solve all the problems presented by this situation, but the Committee on Special Rates has done a great deal. It has brought order out of incipient chaos and has restored road construction, which was becoming a game of blind man's buff, to the position of a legitimate business. Finally its work is rapidly bringing out the basic economic factors involved and may be influential in bringing about a better appreciation on the part of railroads, truckers and public of the true nature of the problems involved.

TABLE I—PRESENT SCALE OF WESTERN TRUNK LINES TARIFF 210 WITHOUT EMERGENCY SURCHARGE

| Distance in miles | Freight charge per net ton, single haul | Joint haul |
|---|---|---|
| 0 to 10 | $0.50 | $0.65 |
| 10 20 | 0.56 | 0.71 |
| 20 30 | 0.62 | 0.77 |
| 30 40 | 0.68 | 0.83 |
| 40 50 | 0.74 | 0.89 |
| 50 60 | 0.80 | 0.95 |
| 60 70 | 0.85 | 1.00 |
| 70 80 | 0.90 | 1.05 |
| 80 90 | 0.95 | 1.10 |
| 90 100 | 1.00 | 1.15 |
| 100 110 | 1.05 | 1.20 |
| 110 120 | 1.10 | 1.25 |
| 120 130 | 1.15 | 1.30 |
| 130 140 | 1.20 | 1.35 |
| 140 150 | 1.25 | 1.40 |
| 150 160 | 1.30 | 1.40 |
| 160 170 | 1.35 | 1.45 |
| 170 180 | 1.40 | 1.50 |
| 180 190 | 1.45 | 1.55 |
| 190 200 | 1.50 | 1.60 |
| 200 230 | 1.60 | 1.70 |
| 230 260 | 1.70 | 1.80 |
| 260 290 | 1.80 | 1.90 |
| 290 320 | 1.90 | 2.00 |
| 320 350 | 2.00 | 2.05 |
| 350 380 | 2.10 | 2.15 |

## Mechanical Power Transmission

A SERIES of 50 reports is being issued by the American Leather Belting Association on "Mechanical Power Transmission from Motor Drive to Industry." Included in these reports will be discussions of studies of driven loads and how to belt them, motors and motor loads and how to belt them, fundamentals of belt transmission, short center drives compared, trouble jobs and how to lock them, modern group drives vs. individual drives, and belt efficiency. A charge is made for these reports.

# Rock Products Papers at Meeting of Institute of Mining Engineers

## Fertilizer Materials Receive Especial Attention

(By a Special Correspondent)

MINING ENGINEERS from all parts of the country gathered in New York February 20 to 23 for the 142nd meeting of the American Institute of Mining and Metallurgical Engineers. Although most of 8000-odd members of the Institute are interested primarily in coal, petroleum, or metals, more than 200 have their chief interest in nonmetals, and the Committee on Nonmetallic Minerals had prepared an interesting all-day program for the final day of the meeting. Much of the value of such gatherings, however, lies in the opportunity they offer for free discussion of pertinent topics, both in regularly scheduled sessions and in informal groups.

The opening session on nonmetals, after being called to order by Chairman Samuel H. Dolbear, was presided over by H. Foster Bain, former secretary of the Institute.

### *Economics of Nonmetals*

The paper, "Some Economic Notes on the Nonmetallic Minerals,"[1] by Paul M. Tyler and Oliver Bowles outlined the trends in consumption of building materials in their relation to building contracts, highway construction, and other factors on which their use depends. The primary purpose of the paper was to point out sources of economic data and to direct thought toward various channels through which an approach may be made to the solution of economic problems.

Statistical records of the Bureau of Mines and the Bureau of the Census along with various indexes prepared by the Bureau of Labor Statistics, the Federal Reserve Board, the F. W. Dodge Corp., and other agencies are available for such use. The discussion of the paper related principally to the present trend toward decentralization of crushed stone, sand and gravel, and other nonmetallic mineral industries.

### *Phosphate Flotation*

C. E. Heinrichs' paper, "Phosphate Flotation, Its Place in the Technology and Economics of the Phosphate Industry,"[2] stated that the greatest contribution to the phosphate industry of this country was the application of flotation. Former recoveries of only 45 to 55% have been stepped up to 90% through the use of flotation methods. Furthermore, the process gives a flexibility as to grade of product that cannot be obtained by any other known means at present.

Flotation also makes possible a greatly reduced capital investment for any given producing capacity, substantially reduces overall production costs, and by doubling recoveries tends to double the available reserves. A forecast was made of another important development in milling: A combined washing and flotation unit, on which experiments have been conducted for the past six months.

### *Costs of Phosphate Recovery*

This interesting general picture of phosphate flotation was followed by a detailed description of costs by H. S. Martin, "Milling Methods and Costs at the No. 2 Concentrator of the Phosphate Recovery Corp."[3] The three plants of the Phosphate Recovery Corp. represented the first commercial phosphate flotation operations and are believed to be the largest nonmetallic flotation projects in the world. The material finer than one millimeter, formerly rejected by the washers as waste, is that now being concentrated by flotation. Since April, 1930, plant No. 2 of the company has produced more than 370,000 long tons of concentrates. Direct operating costs for December, 1931, were $0.1322 per short ton of fuel.

### *Fluorspar in the West*

Ernest F. Burchard in "Fluorspar Deposits in Western United States"[4] described in detail the deposits west of the Mississippi. He mentioned, however, that regardless of the quality of the available spar, the question of markets no doubt would influence the development of deposits. Furthermore, imports from Europe will retard the use of domestic spar at Pacific coast plants except from those mines located within a moderate rail haul of the consumption centers. During the discussion of the paper it was brought out that, since Burchard's field work, three deposits of fluorspar in Nevada have been partially developed; and that they may become of commercial importance when cheap power from Hoover Dam is made available to manufacturing industries.

### *Asphalt Fillers*

The paper, "Mineral Fillers for Sheet-Asphalt Paving Mixtures,"[5] by Alden H. Emery, outlined the properties of asphalt fillers with especial reference to limestone, portland cement, hydrated lime, silica, diatomite, and other nonmetals. Emery pointed out that local conditions might influence not only the type of pavement selected, but also the type of filler, if asphalt be preferred; and in summarizing he stated:

> The purposes of mineral filler in asphalt paving mixture are: (1) to reduce voids and (2) to increase the resistance of the pavement to displacement under traffic. The effect of several variables on these factors is considered. In general, it can be concluded that most inert mineral matter may be used successfully as a filler for sheet-asphalt paving mixtures if the material is ground fine enough, if it has an even grading of sizing, and if the mixture is scientifically designed. There may be more difference between results using two samples of limestone or two samples of any other material than between the two different materials. Mineralogical classification, therefore, should not be used as to standard for selection. What constitutes a satisfactory mix using one filler is not necessarily suitable with another. This can be determined on the basis of laboratory tests, which should be carried out on all proposed filler material prior to its use for this purpose.

In the discussion, vermiculite was suggested as a potential filler, and it was agreed that it would be interesting to make tests to determine what the effect of its laminated structure would be. The point also was raised that limestone and portland cement, being basic, should afford better adhesion with asphalt than would be expected from an acidic filler like quartz. Apparently little fundamental work of this nature has been done, for the question remained unanswered.

### *Fertilizers*

The afternoon session was presided over by Samuel H. Dolbear with Oliver Bowles as vice-chairman. Attendance was about the same as during the morning, varying from 40 to more than 60.

Two papers[6] on fertilizers led off the program. Raymond F. Bacon quoted the New Jersey Agriculture Experiment Station as authority for the statement that about 700,000 tons of sulphur a year are removed from soil by crops. Sulphur, although not

[1] Available only as mimeographed abstract.

[2] Available only as mimeographed abstract.

[3] Available only as mimeographed abstract.

[4] Burchard, E. F.: Fluorspar Deposits in the Western United States: A. I. M. E. Tech. Pub. 500, 1933, 26 pp.

[5] Emery, A. H., Mineral Fillers for Sheet-asphalt Paving Mixtures: A. I. M. E. Contribution No. 17—Pre., 1933, 28 pp.

[6] Bacon, R. F., Use of Sulphur in Agriculture: Huschke, H. A., Use of Lime and Gypsum in Agriculture: Available only as mimeographed abstract.

a complete fertilizer, has its advantages and should be considered as a part of proper fertilizer treatment. H. A. Huschke emphasized the importance of fine grinding of limestone for quick availability in soil conditioning.

### *New Mexico Potash*

With the aid of charts and lantern slides H. I. Smith[7] discussed recent commercial developments in Texas and New Mexico. The area in which sylvite, carnallite, or langbeinite has been found covers about 3000 square miles, and the area in which some potash minerals occur covers about 40,000 square miles. The sinking of a new shaft by a second producing company was begun recently. It was brought out in the discussion that, while the United States now has available sources of potash which would fill domestic needs in a war emergency, under normal conditions imports are likely to continue for a long time because of firmly established relations with importers, and because of high transportation charges from New Mexico to markets. Freight to the nearest port is $4.50 a ton and the water rate to New York, Philadelphia, or Baltimore is about $2.00 a ton.

### *Significance of Polyhalite*

Everett P. Partridge[8] used charts and lantern slides to show outlines of processes developed by the Bureau of Mines for treatment of polyhalite. He stated that six processes already have been developed for the manufacture of potassium salts from polyhalite and that two additional processes are now under investigation. Early investigations were directed toward the use of polyhalite as a source of fertilizer, but, with the discovery of large deposits of the water soluble potassium chloride (sylvite) in New Mexico, later were devoted primarily to the utilization of polyhalite for the manufacture of industrial chemicals, notably potassium sulphate. Estimated costs indicate that the potassium sulphate could be delivered in New York sufficiently below present prices to permit an ample margin for overhead and profit.

A number of Reports of Investigations dealing with the work on polyhalite may be procured from the U. S. Bureau of Mines, Washington, D. C. A limited number of reprints of papers in various scientific and technical journals are also available. Plans are being made to summarize the work in a Bureau of Mines bulletin. The Nonmetallic Minerals Experiment Station will be glad to receive any inquiries, comments, or criticisms concerning the investigation. These should be addressed in care of Rutgers University, New Brunswick, N. J.

The program on nonmetallic minerals was concluded with a motion picture showing the plant of the American Potash and Chemical Corp. at Searles Lake, Trona, Calif. It was described in a most interesting manner by H. S. Emlay.

### *Explosive Shattering of Minerals*

Parts of the meeting other than the Thursday sessions were of interest to rock products men. R. S. Dean and John Gross[9] gave a progress report of their work on explosive shattering of minerals which attracted wide attention last year. The authors reviewed their work as follows:

In a preliminary report made a year ago it was shown that certain minerals when subjected to heating with water under high pressure and temperature were shattered upon the sudden release of that pressure. The main feature in which the results of this method differ from those of conventional grinding is in the differential effect obtained: The more metallic minerals, and hence the valuable minerals, are shattered more readily than are the gangue minerals. In other words, explosive shattering is unique among possible methods for comminuting an ore in that it wastes the least energy on the useless part of the ore. Explosive shattering, therefore, offers possibilities as a means for reducing grinding costs, and it is this potential advantage of the process that makes it worthy of further experimental study.

After a year of additional work on the project the following definite conclusions have been reached:

1. Explosive shattering of minerals and ores is most probably related to aggregate structure.

2. Many ores can be reduced to fine sizes advantageously by explosive shattering.

3. Differential shattering is effective with a number of ores.

The barite deposits of North Carolina were described by Joseph L. Stuckey and Harry T. Davis.[10] Although the geology of these deposits is interesting, they are of little commercial importance, production having been virtually nonexistent since 1926.

### *Committee Meeting*

Prior to the sessions Thursday, the Committee on Nonmetallic Minerals met at a luncheon held in the Engineers Club Tuesday noon. Activities and policies of the committee were discussed. Many problems in nonmetals overlap the field of pure and applied chemistry, but it was the belief of those present that subjects concerning treatment and beneficiation of nonmetallic minerals are proper subjects to be included on the programs arranged for the annual meetings.

Various members at the luncheon and at the sessions commended the activities of the committee and expressed the hope that the good work would be continued. The committee includes a number of representative rock products producers who are members of the Institute and a number of mining engineers in general practice.

[7]Smith, H. I., Potash Developments in Southeastern New Mexico: Available only as mimeographed abstract.

[8]Partridge, E. P., and Emery, A. H., Manufacture of Potassium Salts from Polyhalite and their Significance as Fertilizer Minerals: Available only as mimeographed abstract.

[9]Dean, R. S. and Gross, John, Explosive Shattering of Minerals: R. I. 3201, U. S. Bureau of Mines, 1933, 19 pp.

[10]Stuckey, J. L. and Davis, H. T., Barite Deposits of North Carolina: A. I. M. E. Contribution No. 19—Pre., 1933, 9 pp.

## Gypsum Industry in 1932

ACCORDING to quarterly returns, the amount of crude gypsum mined in the United States during 1932 was about 1,364,900 short tons, or an estimated decrease of 46% as compared with 1931. The amount of domestic and imported rock sold as uncalcined gypsum in 1932 was 505,461 tons, while the amount of calcined gypsum produced from domestic and imported rock was 1,031,280 tons. Corresponding figures for 1931 were 775,242 tons and 1,856,245 tons.

There were practically no developments of major importance in the domestic gypsum industry during the year.

While there were slight reductions in the prices of certain products, the price structure of the gypsum industry as a whole held up remarkably well under adverse conditions. It is reported that crude gypsum prices varied only slightly from the previous year when producers reported sales at an average price of $2.02 per short ton.

The Canadian gypsum industry, which suffered less from the general business slump in 1931 than did that in the United States, decreased its output from 863,752 tons, valued at $2,111,517 in 1931 to 485,205 tons, valued at $1,178,000 in 1932.

## Plan Housing Conference to Stimulate Home Building

A CONFERENCE to stimulate interest in home owning and to show how developments of the immediate past are working to the advantage of the home owner will be held in Chicago in April. Arrangements for the conference are being planned by representatives of cement, gypsum, brick, real estate, plumbing and heating, finance, furniture and publishing interests.

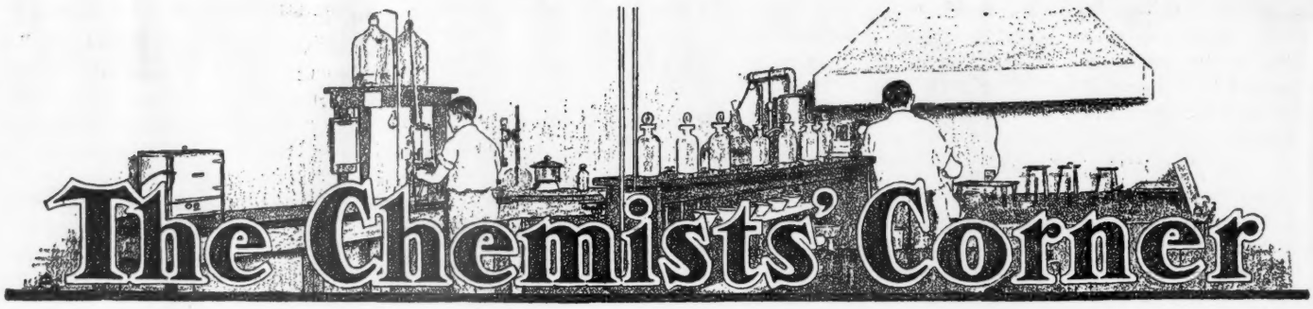
Henry A. Guthrie of Millar's Housing Letter, who started this project, did so in the belief that publicity concerning new types of housing has caused potential home owners to wait to see what developments might be.

Since the housing field is expected to provide an important market for construction materials it was agreed by all interests represented that action to accurately inform the public on the present status of housing was desirable.

## Opens Consulting Office

H. HOUGHTON LAUER, for 13 years chief engineer, Atlas Portland Cement Co., and for the past three years assistant chief engineer, Universal Atlas Cement Co., has resigned to enter consulting engineering.

Mr. Lauer will specialize in reports and valuation of mining and industrial properties, design, construction and remodeling of cement and other industrial plants. He has opened an office at 41 E. 42nd St., New York, N. Y. His engineering experience covers cement and steel plants, coal and metal mining, railroad and municipal work in both the United States and Mexico.




# The Recast Analysis and Its Relation to the Chemistry of Portland Cement*

## Part IX—Computation of Portland Cement Raw Mixtures Continued

By Louis A. Dahl

Research Chemist, California Portland Cement Co., Colton, Calif.

IN THE foregoing discussion we have considered the general problem of calculating three-component mixtures, without reference to portland cement problems, in order to acquaint the reader with certain mathematical principles which enter into all problems of proportioning materials. These principles will now be applied to problems of calculating proportions of materials to form portland cement mixtures, treated from standpoint of design of experimental mixtures.

Let us consider the problem of making mixtures of the materials *A* and *B*, indicated in the following table, the mixtures to be such that their compositions may be expressed in terms of positive values of $C_3S$, $C_2S$ and $C_3A$.

| | —Material— | |
|---|---|---|
| | *A* | *B* |
| CaO | 90 | 5 |
| $Al_2O_3$ | 5 | 20 |
| SiO | 5 | 75 |
| | 100 | 100 |

These two materials, *A* and *B*, are indicated in Fig. 17. All compositions which can be made from these materials are on the line joining *A* and *B*. Only a small part of the possible mixtures of these materials are in the triangle $C_3S$-$C_2S$-$C_3A$, between the points *W* and *X*. It is assumed that *A* and *B* are to be combined to form mixtures in which the fractional proportion of *A* is *x*, and the fractional proportion of *B* is *y*. The potential compositions of *A* and *B*, calculated by means of the equations in Series 11, are shown in Table 6. The potential composition of mixtures of *A* and *B* is shown in the third column.

TABLE 6. POTENTIAL COMPOSITION OF MATERIALS *A* AND *B*

| | *A* | *B* | Mixture |
|---|---|---|---|
| $C_3S$ | 294.80 | —684.08 | $294.80x - 684.08y$ |
| $C_2S$ | —208.05 | 731.08 | $-208.05x + 731.08y$ |
| $C_3A$ | 13.25 | 53.00 | $13.25x + 53.00y$ |

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It will be observed that Table 6 is in the same form as Table 3, the only difference being that in this case compositions are expressed in terms of compounds, and involve negative quantities. Due to the fact that the equations in Series 11 are linear equations of the first degree, it is possible to calculate mixtures expressed in terms of potential composition in the same manner as mixtures are calculated in terms of oxides. To illustrate, let us calculate the proportions of *A* and *B* required to make a mixture in which the potential $C_3S$ is zero. The percentage of potential $C_3S$ in any mixture of *A* and *B* is $294.80x - 684.08y$, as shown in Table 6. The sum of *x* and *y* is 1.00. The values of *x* and *y* may therefore be found by solving the equations,

$$(30) \qquad \begin{aligned} 294.80x - 684.08y &= 0 \\ x + y &= 1 \end{aligned}$$

Solving for *x* and *y*, it is found that $x = 0.6988$, and $y = 0.3012$. A mixture of 0.6988 parts of *A* and 0.3012 parts of *B* will therefore make the desired composition, in which the potential $C_3S$ is zero. This gives us the proportions of *A* and *B* to make the composition *X*, which is on the zero $C_3S$ line (Fig. 17). To find the potential composition of *X* it is only necessary to substitute the values of *x* and *y* just obtained in the expressions in the third column of Table 6, and it is found that it is —0.04% $C_3S$, 74.82% $C_2S$, 25.22% $C_3A$. The percentage of $C_3S$ should be zero, since that was the aim in the computation, but a certain degree of error is introduced in dropping decimals. If the values of *x* and *y* had been calculated to five decimal places the calculated potential composition would be 0.00% $C_3S$, 74.78% $C_2S$, 25.22% $C_3A$.

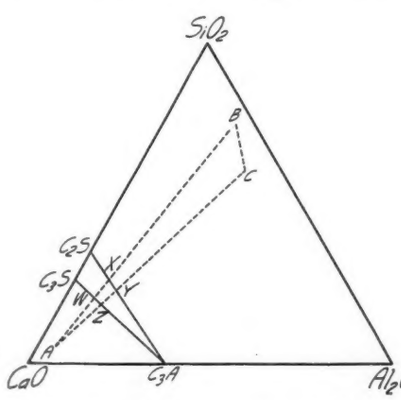



***Fig. 17. Illustrating use of chart to determine composition***

The composition *W* (Fig. 17) is on the zero $C_2S$ line. By equating the expression for $C_2S$ in Table 6 to zero, and following the same procedure as in the previous problem, it is found that the composition *W* can be made by mixing 0.7785 parts of *A* and 0.2215 parts of *B*. Its calculated potential composition is found to be 77.98% $C_3S$, —0.03% $C_2S$, 22.05% $C_3A$. Since all portland cement compositions of the three components lie in the triangle $C_3S$-$C_2S$-$C_3A$, it may be stated that all portland cement compositions which can be made from *A* and *B* can also be made from *W* and *X*. In other words, if it is desired to make a series of mixtures of *A* and *B* in the portland cement range of compositions, *W* and *X* may be made up first as "base mixtures" to be used in making the series, without limiting the range of portland cement compositions which can be made.

Let us now consider mixtures of *A* with *C* (Fig. 17). The material *C* has the composition 10% CaO, 30% $Al_2O_3$, 60% $SiO_2$. All compositions which can be made from *A* and *C* are on the line *YZ*. If it is desired to make a series of mixtures of *A* and *C* in the portland cement range of compositions, *Y* and *Z* may be made up first as "base mixtures" to be used in making such mixtures,

without limiting the range of portland cement compositions which can be made.

Considering the three materials, *A*, *B* and *C*, all compositions which can be made from these materials lie in the triangle *ABC*. All portland cement compositions which can be made from these materials lie in the polygon *WXYZ*. The compositions *W*, *X*, *Y* and *Z* may therefore be made up as base mixtures for making portland compositions without sacrificing any part of the range of compositions involving positive values of potential $C_3S$, $C_2S$ and $C_3A$ which can be made from *A*, *B* and *C*. If a series of experimental mixtures in the portland cement range of compositions are to be made from materials *A*, *B* and *C*, there are therefore at least two courses which may be pursued: (1) each mixture in the series may be made by combining *A*, *B* and *C* in calculated proportions; or (2) each mixture in the series may be made by combining *W*, *X*, *Y* and *Z*, which have been previously made up as base mixtures from *A*, *B* and *C*. The latter course may appear to be superfluous, but it has certain advantages, which will now be shown.

In Table 6 it is shown that the potential $C_3S$ in any mixture of *A* and *B* is $294.80x - 684.08y$. Since the sum of $x$ and $y$ is 1.00, the expression $(1 - x)$ may be substituted for $y$, and we may write:

$$C_3S = 294.80x - 684.08\ (1 - x)$$

(31) or, $C_3S = 978.88x - 684.08$

A change of 1.00 per cent. in the proportion of *A* (or a change of 0.01 in the value of $x$) consequently makes a difference of 9.79% in the potential $C_3S$ in any mixture of *A* and *B*. To obtain a definite predetermined percentage of potential $C_3S$ in any mixture of *A* and *B* it is evident that the materials *A* and *B* must be weighed very accurately, since any error in the percentage of *A* or *B* is multiplied by 9.79 in the percentage of potential $C_3S$ in the mixture. On the other hand, if *W* and *X* are made up as base mixtures, and used in making mixtures, any error in the percentage of *W* or *X* is multiplied by only 0.78 in the potential $C_3S$ in the mixtures. This may be seen from the fact that the potential $C_3S$ in *W* is 77.98%, and the potential $C_3S$ in *X* is zero. A difference of 100% in the proportions of *W* and *X* in a mixture makes 77.98% difference in potential $C_3S$. A difference of 1.00% in the proportions therefore makes 100th of this amount, or 0.78%, difference in the potential $C_3S$. A similar advantage is found when potential $C_2S$ is considered.

The error in $C_3S$ caused by a 1.00% difference in *A* or *B* has been shown to be 9.79%. In the case of *W* and *X* it has been shown to be 0.78%. The ratio of 9.79 to 0.78 is the ratio of the length of the line *AB* to the length of the line *WX*. The difficulty of obtaining a desired potential $C_3S$ or $C_2S$ by mixing *A* and *B* may therefore be described as being due to the fact that the $C_3S$-$C_2S$-$C_3A$ triangle is a long narrow triangle cutting off only a small segment of the line *AB*.

When extreme materials such as *A* and *B* are used in making mixtures there are several sources of error. In the computations it is assumed that only three components are present. If either of the materials absorb moisture or carbon dioxide, a given weight of the material represents less actual *A* or *B* than is desired in the mixture. Since small variations in the proportions of *A* and *B* introduce large variations in potential composition, as has been shown, absorption of moisture or carbon dioxide may introduce considerable error, and it is necessary to guard against such influences continually, both in storing the materials and in weighing.

If raw materials are used which contain constituents that are expelled in the process of clinkering, variations in the proportions of such constituents have a similar large influence on the potential composition of mixtures. Another source of error is the difference in procedure in the chemical analysis of the extreme materials. Material *A* can be brought into solution by blasting. Material *B* must be fused with sodium carbonate before it can be dissolved for analysis. Materials made up as base mixtures in the $C_3S$-$C_2S$-$C_3A$ triangle, or on its boundaries (such as *W*, *X*, *Y* and *Z* in Fig. 17) can be burned to a clinker in the laboratory, and then dissolved in acid. The analytical procedure for all of the base mixtures is identical, leading to a degree of consistency which cannot be obtained when extreme materials are used.

One of the chief advantages of the base mixture plan is the elimination of a great many chemical analyses. If extreme materials are used the possibility of error is so great that it is necessary to make a chemical analysis of each mixture, and to make suitable corrections. If base mixtures are made up, each intimately mixed and carefully analyzed, desired compositions can be made from them within the degree of accuracy of the analyses, so that it is not necessary to make chemical analyses for the purpose of calculating corrections.

A point which must always be observed in following the base mixture plan is to make sure that the field of compositions which can be made is not limited. It has been shown, for instance, that *W*, *X*, *Y* and *Z* (Fig. 17) will make any portland cement mixtures which can be made from *A*, *B* and *C*. In this case, since only portland cement compositions are to be made, the range of compositions which can be made has not been limited in the design of the base mixtures. In the discussion of Fig. 15 it was shown that it may sometimes appear to be possible to make a desired composition from a given set of materials, when actually it cannot be made. This situation will appear repeatedly when base mixtures are not properly designed. For instance, if base mixtures *W*, *X* and *Y* (Fig. 17) are made up from *A*, *B* and *C*, the range of portland cement compositions will be limited. Only a part of the compositions which can be made from *A*, *B* and *C* in the portland cement range of composition are possible, because of the omission of *Z* as a base mixture. In general, it may be stated that the number of base mixtures required to avoid limiting the range of portland cement compositions is always greater than the number of extreme materials.

In the computations which have been illustrated only one component has been controlled. For instance, in calculating the proportions of *A* and *B* (Fig. 17) required to make the base mixture *X*, the problem consisted in the calculation of a mixture of *A* and *B* in which the potential $C_3S$ would have the value zero. The percentages of $C_2S$ and $C_3A$ were not fixed in advance, but were calculated after the proportions of *A* and *B* were known. This was not a matter of choice, but necessity, because with two materials to be used in making mixtures only one component can be given a predetermined value. If two components are to be given pre-determined values, three materials are needed.

In general, the number of materials required for making a mixture is one greater than the number of components which are to be given predetermined values. This rule applies in all computations, regardless of the number of components. If all of the components are to be controlled the number of materials required is equal to the number of components. This appears to be an exception to the rule, but actually is not, because in the computations one of the components can be omitted.

(*To be continued*)

## Heat Transfer from Gas Stream to Broken Solids

THE work of the Bureau of Mines in the study of heat transfer is described by C. C. Furnas in Bulletin 361, recently published by the Bureau of Mines, U. S. Department of Commerce.

The methods used and the data obtained are given in the 88 page book, along with the equations derived from the data.

The heat transfer from a gas stream to a bed of broken solids is expressed by the formula

$$k = \frac{A u^{0.7} T^{0.3} 10^{1.68f - 3.65f}}{d^{0.9}}$$

where

- k = B.t.u. per second per degree F. per cu. ft. of overall volume of the bed.
- u = rate of flow in cu. ft. per sec. per sq. ft. of sectional area of bed.
- T = deg. F., absolute.
- d = particle diameter in feet.
- f = fractional value of voids in bed (no units).
- A = constant for each substance.

The data on the rate of calcination of limestone referred to in the bulletin was published in Rock Products, June 20, 1931.

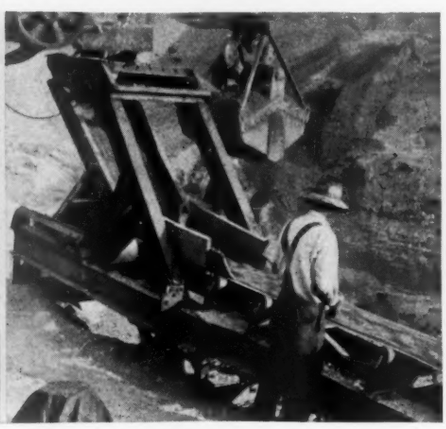
# Hints and Helps for Superintendents

## Grizzly to Prevent Excess of Fines at Pit

TO ELIMINATE an excess of fines with a minimum of handling an Illinois gravel plant uses a special screen in the pit which removes a considerable amount of this material before it reaches the plant.

At this operation the material was loaded to a movable hopper in the pit which in turn loaded to a conveyor that carries the material to the plant. So above the end of the conveyor a framework holding a home-made grizzly was installed. The frame was of channel iron and is shown in the accompanying illustrations. The grizzly was made up of ¼-in. round bars spaced as closely together as possible, so that nothing but sand would pass through.

As the material is fed from the hopper, it falls to the grizzly which permits most of the fine material to pass through and off beyond the end of the conveyor while the coarser material and a portion of the fines slide down to the conveyor belt. The slope of the grizzly is adjustable and the percentage of fines that goes to the plant can be regulated. Increasing the slope of the screen decreases the amount of fines passing.



*Grizzly saves unnecessary handling of fines*

*Dump body quickly built when emergency requires*

## Emergency Dump Truck Body

ONE Illinois gravel producer had a truck chassis which he desired to use as a dump truck although the original body of the truck was not of the dumping type.

A new wooden body was built with a rear gate for dumping. Timbers were bolted to the frame of the truck above the rear axle and the dump body was pivoted to these timbers. Immediately behind the truck cab an *A*-frame was erected with its two legs bolted to the truck frame. At the top of this frame a pulley was installed for a block and tackle which was used to raise the forward end of the body for dumping. The rope from the tackle was securely fastened to the timber frame of the new body so that by pulling on the other end of the rope the forward part of the body is raised and the truck is dumped. The tackle can be worked by hand or a small drum and crank can be installed just behind the cab.

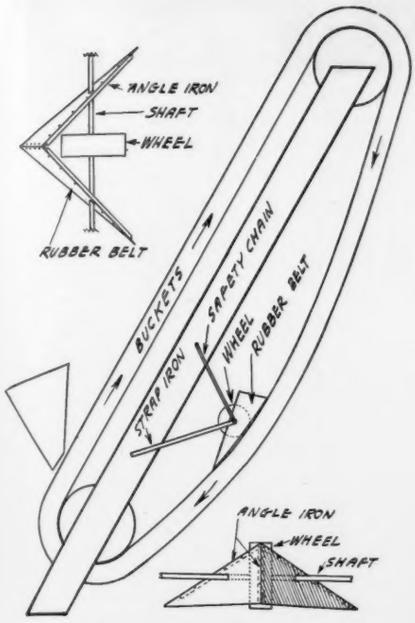
This body did very satisfactorily for an emergency unit, although it is somewhat clumsy in operation for continuous use. It was inexpensively and quickly made and served well on the job on which it was used.

## Protecting the Elevator Belt from Wear

By Dare Paris
Monrovia, Calif.

IN THE OPERATION of stone elevators trouble is often caused by rock falling from the buckets, some of which falls between the tail pulley and the belt. This causes much avoidable wear on the belt.

An arrangement to eliminate this that has proved satisfactory is shown in accompanying illustrations. A belt is bolted together



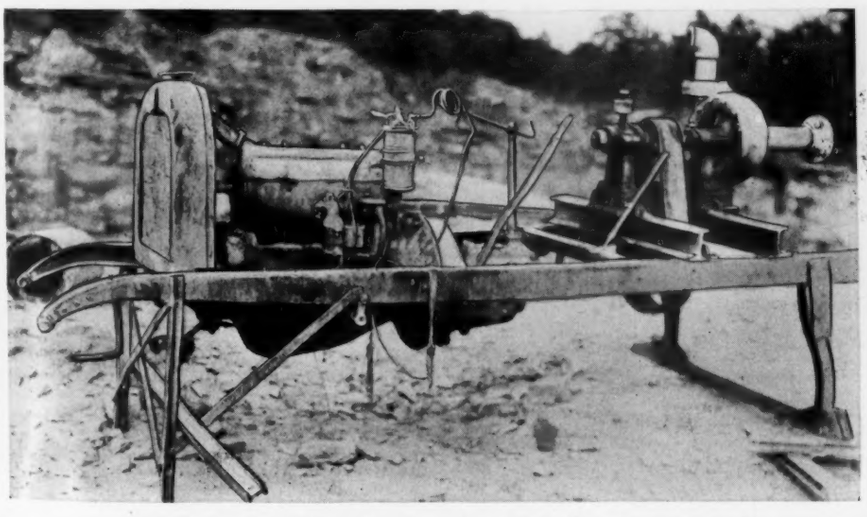

***Deflector of discarded belt***

in a V-shape on an angle iron frame. This is made the width of the conveyor belt. It is supported on a 6-x 18-in. pulley so that the cleaning device just clears the conveyor belt. The pulley is held in place by one rigid supporting arm and a flexible member.

## Portable Pumping Unit for Quarry or Sand Pit

A PORTABLE pumping unit can be made by mounting a small pump on the rear of an old auto frame and connecting it by a belt to a pulley on the drive shaft of the engine. The engine and frame of the car are left intact, but the rest of the car is stripped away. The speed of the pump can readily be governed by the speed of the engine. The result is a simple and inexpensive operation which has the added feature of flexibility.

The wheels can be left on the auto frame so that it is easy to move the pump from place to place in the quarry, or they can be removed and legs substituted at the corners, as in the accompanying illustration, to add rigidity to the unit.



***Wheels may be left on frame, where portable unit is desired***

## Office Stove Burns Waste Oil

THE KINGMAN, Ariz., plant of the Consolidated Feldspar Corp. uses a Diesel engine for driving the crushing and pulverizing equipment, which means that at times there is a considerable amount of waste crank case oil. So the superintendent devised a simple and economical method of using this oil to heat the office.

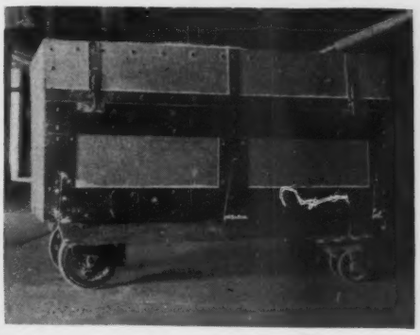
***Makes heat cheaply***

A stove was made from a 50-gal. grease drum with a small metal door hinged near the top. The waste oil is stored in a second drum located outside the building and the oil is carried to the stove by a ¼-in. pipe line having a small needle valve in the line. The waste oil is allowed to drop into the stove, where it gives off sufficient heat to warm the office as it burns.

In starting such a fire it is of course advisable to have some old waste paper in the stove. There is no interior construction in the stove.

## Car for Floor Cleanings

IN ALL of the mills of the Standard Gypsum Co., San Francisco, Calif., strict cleanliness is insisted on and neatness is a watchword. There is none of the litter, dust, etc., around the sacking machines that is found at some operations. Of great help in maintaining clean floors is the waste car shown in the illustration.



***Load is easily removed***

The box shown has a pair of discarded hand truck wheels for front wheels and at the rear are two large casters resurrected from the scrap pile. The body is of light steel plate construction. The lower two-thirds of the sides are hinged at the bottom and have two latches at the top. When the latches are disengaged the door acts as a dump board.

The box can be wheeled about the floor as desired and, when full, pushed to the door and side-dumped to a truck which hauls the material to waste.

## Asphalt Fillers

ACCORDING to Alden H. Emery,* of the U. S. Bureau of Mines, the city of Flint, Mich., obtained very low stability values for an asphalt paving filler made from an air-classified limestone dust, although it was extremely fine. This experience, he states, may indicate that the product from an air-swept tube mill is not as satisfactory a filler as that from an ordinary tube mill. In an air-swept mill, the particles are carried from the grinding system as soon as they are reduced to a certain size, and the product is composed of particles approaching a uniform size classification. In the ordinary mill, the fine particles remain for a longer period and are reduced to a still finer size while the coarse material is being made fine, which gives a graded product.

*Mineral Fillers for Sheet-Asphalt Paving Mixtures, Contribution No. 17 (Class H, Nonmetallic Minerals) February, 1933.

# Editor Shaw's Letter from Los Angeles

## Greater Use of Concrete Would Have Saved Lives and Property in Earthquake Area

EVERY great natural disaster—the St. Louis tornado, the Miami hurricance, the San Francisco, Tokyo and New Zealand earthquakes—has its lessons for builders and the producers of building materials. And the lessons of the Los Angeles-Long Beach earthquake are especially important because they are so easily read and so convincing.

The death roll has reached 130 as this is written and there are about 1500 cases of severe injury. The property loss will exceed $50,000,000. These are appalling figures. But more appalling still is the conviction that comes to anyone who studies this disaster that: *With very few exceptions, every name on this death roll and every name of a sufferer now lying in a hospital bed is that of a victim of bad construction and wrong building materials.*

Consider this. This earthquake was followed by no such conflagration as that which killed hundreds in San Francisco and those which killed thousands in Tokyo and Yokohama. There was no great landslip, as there was in the recent New Zealand disaster. There was only an ordinary earthquake, and not very much of an earthquake according to the seismic laboratory reports. A large percentage of the buildings, even where the shock was most severe, are so little damaged that a few hundred dollars will repair any one of them, and there is a considerable percentage of buildings that have escaped injury. Yet other buildings collapsed, killing many persons, 12 in one case, and the streets were filled with falling bricks that killed and maimed hundreds of people, pedestrians and those who were in automobiles. Every one of these victims is a martyr to the greed and stupidity that built shoddy structures, and the still greater stupidity of those in authority who permitted such structures to be built. They had no excuse, for after the San Francisco and Santa Barbara earthquakes there is no one interested in building on the Pacific Coast but who knows safe from unsafe construction.

Brick construction of the usual type stands utterly condemned for buildings in this section. Every important building failure of which I have heard, including churches, school houses, cinema theatres and so on, was that of a brick structure. Brick veneer is another type that did not stand well, the brick coating being thrown from the walls, which were otherwise unharmed in some cases. Every photograph taken soon after the quake shows a big pile of brick in the foreground. Hollow tile, I am told, although I have seen no cases myself, is another material that did not stand the shock well.

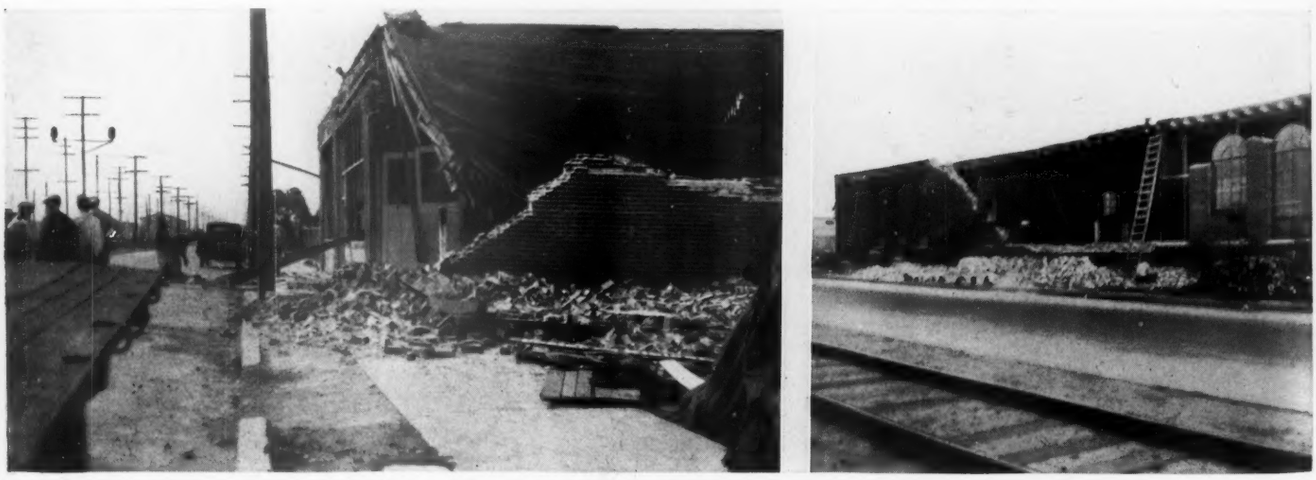
The worst of all the failures are those of the schoolhouses of the district, of which all Southern California used to be so proud. They were magnificent structures to look at but of 392 in the district affected, 148 are damaged, according to the *Los Angeles Times*. Even in Los Angeles, itself, where the earthquake damage was comparatively little, many schools will require extensive repairs and one or two will have to be razed. In Long Beach 13 schoolhouses, all of brick, are flat or will have to be razed and many others are injured. And this is true of the many brick churches there.

The imagination refuses to picture what would have happened if these schools had been full of pupils and teachers. The citizens are rightfully indignant and the papers are demanding by editorial and cartoon to know who is responsible and what vested interests profited by the choice of building materials and methods known to be unsafe.

Architects' reports show that all "Class A" construction stood well everywhere. In fact it might almost be said that everything with a frame stood well. And the readers of Rock Products will be especially interested to know that both reinforced concrete and concrete building units have given an excellent account of themselves. The survey of course is not yet wholly completed, but it has included the important structures. And I can state this on very good authority, that of engineers familiar with construction who have given the structures thorough inspection. There are a few cases in which concrete columns are cracked and broken but they are still holding up the building.

A prominent architect making a report on the damaged school houses notes that where these were partly of brick and partly of reinforced concrete that the concrete portion is standing well while the brick portion has fallen. And he recommends the use of reinforced concrete and steel frame for the buildings that will replace the badly damaged schoolhouses.

A word should be said here about the stucco-clad frame houses that are so common here. All I have seen have stood very well indeed. I know of one that stood where actual measurement showed that a sidewalk had shifted nine inches. Doors were opened and a piano and other heavy things were shoved about but the stucco coating showed no new cracks. This was portland cement stucco, and so have the others been from which I have heard favorable reports. Plastered on chicken wire or on a heavier mesh it seems to make a very effective armor and the bracing between the studding which the code requires makes a strong frame.



***What the earthquake did to brick buildings in Los Angeles and Long Beach, Calif.***

# Editorial Comment

**Central Selling Agencies Are Legal**

On March 13 the United States Supreme Court decided that a combination of producers to limit their own production and sell at a uniform price may be legal, ethical and good economics. The case decided was that of the Appalachian Coals, Inc., et al v. the United States. The Appalachian Coals, Inc., is a selling agency established by a group of 137 competitive producers of bituminous coal. The decision reverses that of the District Court for the Western District of Virginia (ROCK PRODUCTS, October 22, 1932) and establishes some new and important principles in "the rule of reason" in the interpretation of the federal anti-trust laws.

In the words of the Supreme Court decision: "The challenged combination lies in the creation by the defendant producers of an exclusive selling agency. Defendant producers own all its capital stock, their holdings being in proportion to their production. The majority of common stock, which has exclusive voting right, is held by 17 defendants (directors). By uniform contracts, separately made, each defendant producer constitutes the Appalachian Coals, Inc., an exclusive agent for the sale of all coal (with certain exceptions) which the producer mines in the territory covered. The selling agency agrees to establish standard classifications, to sell all the coal of its principals at the best prices obtainable and, if all cannot be sold, to apportion orders on a stated basis. The plan contemplates that prices are to be fixed by the officers of the selling agency at its central office, save that upon contracts calling for future delivery after 60 days, the agency must obtain the producer's consent. The selling agency is to be paid a commission of 10% of the gross selling prices, f. o. b. mines, and guarantees accounts. In order to preserve their existing sales outlets, the producers may designate subagents, according to an agreed form of contract, who are to sell upon the terms and prices established by the sales agency and are allowed by the agency commissions of 8%."

The Supreme Court's basis for reversing the decision of the lower court may be found in the following extracts: "As a charter of freedom, the Sherman anti-trust act has a generality and adaptability comparable to that found desirable in constitutional provisions. Its general phrases, interpreted to attain its fundamental objects, set up the essential standard of reasonableness. They call for vigilance in the detection and frustration of all efforts unduly to restrain the free course of interstate commerce, but they do not seek to establish a mere delusive liberty either by making impossible the normal and fair expansion of that commerce or the adoption of reasonable measures to protect it from injurious and destructive practices and to promote competition upon a sound basis."

The Court laid much stress on the prevailing economic conditions in the coal industry, due to over-expansion (conditions, of course, that apply to practically all the mineral industries); various destructive competitive practices (all unfortunately more or less common today in all basic commodity industries); lack of standardization (just as in the lime and aggregate industries); organized buying power (such as the rock products industries find in state highway departments). The conclusions are that the defendants are engaged in a fair and open endeavor to aid the industry in a measurable recovery from its plight. The question considered was chiefly the effect of the plan on prices, which obviously it was intended to raise. The decision is that: "the evidence as to the conditions of the production and distribution of bituminous coal, the available facilities for its transportation, the extent of developed mining capacity, and the vast potential undeveloped capacity, makes it impossible to conclude that the defendants through the operation of their plan will be able to fix the price of coal in the consuming markets; their selling agency will find itself confronted by effective competition backed by virtually inexhaustible sources of supply, and will be compelled to cope with the organized buying power of large consumers; the plan cannot be said either to contemplate or to involve the fixing of market prices."

The crux of the decision is contained in the following extract: "A cooperative enterprise, otherwise free from objection, which carries with it no monopolistic menace, is not to be condemned as an undue restraint merely because it may effect a change in market conditions, where the change would be in mitigation of recognized evils and would not impair, but rather foster, their fair competitive opportunities. Voluntary action to rescue and preserve these opportunities, and thus aid in relieving a depressed industry and in reviving commerce by placing competition upon a sounder basis, may be more efficacious than an attempt to provide remedies through legal processes. The fact that the correction of abuses may tend to stabilize a business, or to produce fairer price levels, does not mean that the abuses should go uncorrected or that cooperative endeavor to correct them necessarily constitutes an unreasonable restraint of trade. The intelligent conduct of commerce through the acquisition of full information of all relevant facts may properly be sought by the cooperation of those engaged in trade, although stabilization of trade and more reasonable prices may result."

The Court further recognized the absurdity of an interpretation of the law that would drive independent producers into an actual merger, where voluntary cooperation would be more likely to insure genuine competition. However, the Court makes this reservation: "If in the actual operation of its plan the selling agency should prove an undue restraint upon interstate commerce, if it should appear that the plan is used to the impairment of fair competitive opportunities, the decision upon the present record should not preclude the Government from seeking the remedy which would be suited to such a state of facts."

# Recent Quotations on Rock Products Securities

| Stock | Date | Bid | Asked | *Dividend |
|---|---|---|---|---|
| Allentown P. C. 1st 6's[47] | 3-21-33 | No market | | |
| Alpha P. C. com. | 3-21-33 | 6 | 7½ | 25c qu. Apr. 25 |
| Alpha P. C. pfd. | 3-18-33 | 50 | 85 | 1.75 qu. Mar.15,'33 |
| Amalgamated Phos. 6's, '36[19] | 12-24-32 | 92 | 95 | |
| American Aggregates com.[47] | 3-23-33 | 1 | 2 | |
| American Aggregates pfd.[47] | 3-23-33 | 8 | 11 | 1.75 qu. Jan. 1 |
| American Aggregates 6's w.w.[47] | 3-23-33 | 29 | 32 | |
| American Aggregates 6's ex-w.[47] | 3-23-33 | 25 | 27 | |
| Amer. L. & S. 1st 7's | 2-21-33 | 40 | ..... | |
| Arundel Corp. com. | 2-18-33 | 12½ | 13½ | 50c qu. Jan. 3, '33 |
| Bessemer L. & C. Class A[4] | 3-14-33 | 1 | 3 | |
| Bessemer L. & C. 1st 6½'s[4] | 3-14-33 | 19½ | ..... | |
| Bessemer L. & C. cert. of dep.[4] | 3-14-33 | 14¼ actual sale | | |
| Bloomington Limestone 6's | 2-21-33 | No market | | |
| Boston S. & G. com.[37] | 3-14-33 | 1 | 3 | 5c qu. July 1 |
| Boston S. & G. 7% pfd.[37] | 3-14-33 | 10 | 20 | 1.75 qu. Jan. 3, '33 |
| Boston S. & G. 7's, 1934[19] | 3-14-33 | 50 | 60 | |
| California Art Tile, A[9] | 3-18-33 | ½ | 1 | |
| California Art Tile, B[9] | 3-18-33 | ..... | ¾ | |
| Calaveras Cement com.[9] | 3-18-33 | 1 | 2½ | |
| Calaveras Cement 7% pfd.[9] | 3-18-33 | 47 | 60 | 1.75 qu. Apr. 15,'33 |
| Canada Cement com. | 2-18-33 | 3⅛ | 3⅜ | |
| Canada Cement pfd. | 2-18-33 | 20¼ | 20 | 1.62½ qu. June 30 |
| Canada Cement 5½'s, 1947 | 3-17-33 | 49 | 53 | |
| Canada Crushed Stone bonds[42] | 3-15-33 | 71½ | ..... | |
| Canada Crushed Stone com.[42] | 3-15-33 | No market | | |
| Certainteed Products com. | 3-21-33 | 1⅛ | 1½ | |
| Certainteed Products pfd. | 3-21-33 | 4 | 8½ | 1.75 qu. Jan. 1 |
| Certainteed Products 5½'s | 1-16-33 | 39 actual sale | | |
| Cleveland Quarries | 2-18-33 | ..... | 16 | 10c qu. Dec. 1 |
| Consol. Cement 1st 6½'s, A[44] | 3-21-33 | 3 | 6 | |
| Consol. Cement pfd. | 2-21-33 | No market | | |
| Consolidated Oka Sand and Gravel (Canada).6½'s[12] | 3-15-33 | ..... | 35 | |
| Consolidated Oka Sand and Gravel (Canada) pfd.[42] | 12-27-32 | ..... | 50 | |
| Consol. Rock Prod. com.[9] | 3-18-33 | 10c | 25c | |
| Consol. Rock Prod. pfd.[9] | 3-18-33 | 25c | 50c | |
| Consol. Rock Products units[35] | 3-13-33 | 20c | 50c | |
| Consol. S. & G. pfd. (Can.) | 1-16-33 | ..... | 50 | 50c qu. Nov. 15 |
| Construction Mat. com. | 1-16-33 | ⅛ | 1 | |
| Construction Mat. pfd. | 3- 2-33 | 1⅛ | 4½ | |
| Consumers Rock and Gravel, 1st Mtg. 6's, 1948[35] | 12-22-32 | 18 | 22 | |
| Coosa P. C. 1st 6's | 1-18-33 | 10 | ..... | |
| Coplay Cem. Mfg. pfd.[47] | 3-21-33 | 4 | 6 | |
| Coplay Cem. Mfg. 6's, 1941[47] | 3-21-33 | 50 | 55 | |
| Dewey P. C. com.[47] | 3-21-33 | 45 | 55 | |
| Dolese and Shepard | 3-21-33 | 9 | 11 | $1 qu. Jan. 1 |
| Dufferin Pav. & Cr. Stone pfd. | 3-17-33 | 6 actual sale | | 1.75 qu. Apr. 1 |
| Dufferin Pav. & Cr. Stone com. | 3-17-33 | 1 actual sale | | |
| Edison P. C. com.[47] | 3-21-33 | 1 | 3 | |
| Edison P. C. pfd.[47] | 3-21-33 | 2 | 4 | |
| Federal P. C. 6½'s, 1941[47] | 3-21-33 | 50 | 55 | |
| Giant P. C. com.[47] | 3-21-33 | 1 | 3 | |
| Giant P. C. pfd.[47] | 3-21-33 | 3 | 5 | |
| Gyp. Lime & Alabastine, Ltd. | 3-17-33 | 1⅞ actual sale | | |
| Gyp. Lime & Alabastine 5½'s, 1948 | 3-17-33 | 28 | 30 | |
| Hermitage Cement com.[47] | 3-21-33 | 4 | 7 | |
| Hermitage Cement pfd.[47] | 3-21-33 | 18 | 22 | |
| Ideal Cement 5's, 1943[47] | 3-21-33 | 76 | 79 | |
| Ideal Cement com. | 3-20-33 | 8½ | 9 | 50c qu. Mar. 31 |
| Indiana Limestone 6's | 2-21-33 | No market | | |
| International Cem. com. | 3-21-33 | 8 | 8½ | 50c qu. Mar. 31 |
| International Cem. bonds, 5's | 1-16-33 | 60¼ actual sale | | Semi-ann. int. |
| Kelley Island L. & T. | 2-18-33 | 8½ | 9½ | 25c qu. Jan. 2, '33 |
| Ky. Cons. Stone com.[45] | 2-16-33 | No market | | |
| Ky. Cons. Stone 7% pfd.[45] | 2-16-33 | No market | | |
| Ky. Cons. Stone 1st Mtg. 6½'s[45] | 2-16-33 | 8 | 10 (nominal) | |
| Ky. Cons. St. V. T. C.[48] | 3-16-33 | No market | | |
| Ky. Rock Asphalt com. | 2-18-33 | ¾ | 1¼ | |
| Ky. Rock Asphalt pfd. | 2-18-33 | 8½ | 12 | |
| Ky. Rock Asphalt 6½'s, '38 | 2-18-33 | 53 | 55 | |
| Lawrence P. C. | 3-20-33 | 4 | 7 | |
| Lawrence P. C. 5½'s, 1942[47] | 3-21-33 | 32 | 35 | |
| Lehigh P. C. com. | 3-21-33 | 7 | 9½ | |
| Lehigh P. C. pfd. | 3-21-33 | 42 | 45 | 87½c qu.Apr.1,'33 |
| Louisville Cement[47] | 3-21-33 | 38 | 42 | |
| Lyman-Richey 1st 6's. 1935[13] | 3-15-33 | 85 | 95 (nominal) | |
| Marbelite Corp. com.[35] (cement products) | 3-13-33 | 5c | 50c | |
| Marbelite Corp. pfd.[35] | 3-13-33 | 25c | ..... | |
| Marquette Cement com.[47] | 3-21-33 | 6 | 7 | |
| Marquette Cement pfd.[47] | 3-21-33 | 40 | 45 | 1.50 qu. Jan.3,'33 |
| Marquette Cem. Mfg. 1st 5's, 1936[46] | 3-21-33 | 55 | ..... | |
| Marquette Cem. Mfg. 1st 6's, 1936[46] | 3-21-33 | 65 | ..... | |
| Material Service Corp. | 3- 2-33 | 5½ | 8 | |
| McCrady-Rodgers 7% pfd.[22] | 3-14-33 | 25 | 30 | 87½c qu. June 30 |
| McCrady-Rodgers com.[22] | 3-14-33 | No market | | 75c qu. Jan. 26 |
| Medusa P. C. pfd.[47] | 3-21-33 | 25 | 30 | 1.50 qu. Apr. 1 |
| Medusa P. C. com.[47] | 3-21-33 | 3 | 5 | |
| Michigan L. & C. com[6] | 12-24-32 | 52 | ..... | |
| Missouri P. C. | 3- 2-33 | 5 | 5½ | 25c qu. Jan. 30 |
| Monarch Cement com.[47] | 3-21-33 | 30 | 35 | |
| Monolith Portland Midwest[9] | 3-18-33 | 15c | 25c | |
| Monolith P. C. com.[9] | 3-18-33 | 1 | 1½ | 40c s.-a. Jan. 1 |
| Monolith P. C. pfd.[9] | 3-18-33 | 1¾ | 2¼ | 40c s.-a. Jan. 1 |
| Monolith P. C. units[9] | 3-18-33 | 4½ | 6 | |
| Monolith P. C. 1st Mtg. 6's[9] | 3-18-33 | 45 | 48 | |
| National Cem. (Can.) 1st 7's | 2-21-33 | 70 | 80 (nominal) | |
| National Gypsum A com. | 3-21-33 | 2 | 3 | |
| National Gypsum pfd. | 3-21-33 | 34 | 37 | 1.75 qu. Apr. 1, '33 |
| National Gypsum 6's[3] | 3-21-33 | 68 | ..... | |
| National L. & S. 6½'s, 1941[19] | 12-24-32 | 65 | 75 | |
| Nazareth Cement com.[47] | 3-21-33 | 2 | 4 | |
| Nazareth Cement pfd.[47] | 3-21-33 | 15 | 18 | |
| Newaygo P. C. 1st 6½'s[47] | 3-21-33 | 35 | 38 | |
| New England Lime 6's, 1935[14] | 2-16-33 | 10 (nominal) | | |
| N. Y. Trap Rock 1st 6's | 3-21-33 | 45½ actual sale | | |
| N. Y. Trap Rock 7% pfd. | 2-21-33 | ..... | 50 | 1.75 qu. Jan. 3, '33 |
| North Amer. Cem. 1st 6½'s | 3-20-33 | 7% | | |
| North Amer. Cem. com. | 2-21-33 | No market | | |
| North Amer. Cem. 7% pfd. | 2-21-33 | ½ | ..... | |
| North Shore Mat. 1st 6's[18] | 3-21-33 | 25 (nominal) | | |
| Northwestern States P. C.[47] | 3-21-33 | 25 | 28 | |
| Ohio River S. & G. com. | 2-18-33 | ..... | 5 | |
| Ohio River S. & G. 1st pfd. | 2-18-33 | ..... | 50 | |
| Ohio River S. & G. 2d pfd. | 2-18-33 | ..... | 20 | |
| Ohio River S. & G. 6's[19] | 12-24-32 | 40 | 50 | |
| Oregon P. C. com.[9] | 12-22-32 | 8 | 12 | |
| Oregon P. C. pfd.[9] | 12-22-32 | 80 | 85 | |
| Pacific Coast Aggr. com.[40] | 3-13-33 | ..... | 1 | |
| Pacific Coast Aggr. pfd.[40] | 3-13-33 | ..... | 2 | |
| Pacific Coast Aggr. 6½'s, 1944[5] | 12-23-32 | 10 | 11 | |
| Pacific Coast Aggr. 7's, 1939[5] | 12-23-32 | 3 | 5 | |
| Pacific Coast Cement 6's | 2-28-33 | 35 | 39 | |
| Pacific P. C. com.[9] | 2-15-33 | 3 | ..... | |
| Pacific P. C. pfd. | 2-17-33 | 30 actual sale | | 1.62½ qu. Jan.5.'33 |
| Pacific P. C. 6's, 1935[47] | 3-23-33 | 83 | 85 | |
| Pacific P. C. 6's, 1936[47] | 3-23-33 | 83 | 85 | |
| Peerless Cement com.[47] | 3-21-33 | 10c | 20c | |
| Peerless Cement pfd.[47] | 3-21-33 | 2 | 3 | |
| Penn.-Dixie Cement com. | 3-21-33 | 1 | 1¼ | |
| Penn.-Dixie Cement pfd. | 3-21-33 | 4⅝ | 6 | |
| Penn.-Dixie Cement 6's | 3-21-33 | 41 actual sale | | |
| Penn. Glass Sand Corp. pfd. | 1-18-33 | 35 | 45 | 1.75 qu. Apr. 1 |
| Penn. Glass Sand Corp. 6's[19] | 12- 2-32 | 75 | 80 | |
| Petoskey P. C. | 3- 2-33 | 1¼ | 1¾ | |
| Port Stockton Cem. com.[9] | 3-18-33 | No market | | |
| Riverside Cement, A[9] | 3-18-33 | 3 | 4½ | |
| Riverside Cement, B[9] | 3-18-33 | 75c | 1½ | |
| Riverside Cement pfd. | 3-18-33 | 55 | 60 | 1.50 qu. Feb. 1, '33 |
| Sandusky Cement 6's[47] | 3-23-33 | 40 | 50 | |
| Sandusky Cement 6½'s, 1932-37 | 2-21-33 | 65 | 75 | |
| Santa Cruz P. C. com.[47] | 3-23-33 | 42 | 44 | $1 qu. Jan. 1, '33 |
| Schumacher Wallboard com. | 3- 6-33 | 1 actual sale | | |
| Schumacher Wallboard pfd. | 1-13-33 | 3 | ..... | 50c qu. May 15 |
| Signal Mt. P. C. pfd.[47] | 3-21-33 | 3 | 5 | |
| Southwestern P. C. units[47] | 3-21-33 | 95 | 105 | |
| Southwestern P. C. com.[47] | 3-21-33 | 10 | 15 | $1 qu. Jan. 1, '33 |
| Southwestern P. C. pfd.[47] | 3-21-33 | 50 | 55 | $2 qu. Jan. 1, '33 |
| Standard Paving & Mat. (Canada) com. | 3-17-33 | ¾ actual sale | | |
| Standard Paving & Mat. pfd. | 3-17-33 | No market | | 50c qu. Nov. 15 |
| Superior P. C., A[9] | 3-18-33 | 20½ | 26¼ | 27½c mo. Apr.1,'33 |
| Superior P. C., B[9] | 3-18-33 | 5 | 8¼ | 12½c Dec. 20 |
| Trinity P. C. units[47] | 3-21-33 | 10 | 15 | |
| Trinity P. C. com.[47] | 3-21-33 | 1 | 3 | |
| Trinity P. C. pfd.[47] | 3-21-33 | 7 | 10 | |
| U. S. Gypsum com. | 3-21-33 | 20⅛ | 20¾ | 25c qu. Apr. 1, '33 |
| U. S. Gypsum pfd. | 3-21-33 | 103½ | ..... | 1.75 qu. Apr. 1, '33 |
| Wabash P. C.[47] | 3-21-33 | 3 | 5 | |
| Warner Co. com. | 1-18-33 | 2 | 3 | |
| Warner Co. 1st 7% pfd. | 1-18-33 | 13 | 18 | 1.75 qu. Apr. 1 |
| Warner Co. 6's, 1944, w. w. | 3- 3-33 | 14⅛ actual sale | | |
| Whitehall Cem. Mfg. com.[47] | 3-21-33 | 8 | 10 | |
| Whitehall Cem. Mfg. pfd.[47] | 3-21-33 | 17 | 20 | |
| Wiscon. L. & C. 1st 6's, '33[15] | 3-21-33 | 25 (nominal) | | |
| Wiscon. L. & C. 6½'s[19] | 12-24-32 | 25 | 35 | |
| Wolverine P. C. com. | 3- 2-33 | ..... | 3 | |
| Yosemite P. C., A com.[9] | 2-15-33 | 1⅛ | ..... | |

*Latest 1932 dividend unless otherwise stated.

Quotations by: [1]Watling Lerchen & Hayes Co., Detroit, Mich. [2]Bristol & Willett, New York. [3]Rogers, Tracy Co., Chicago. [4]Butler, Wick & Co., Youngstown, Ohio. [5]Smith, Camp & Riley, San Francisco, Calif. [6]Frederick H. Hatch & Co., New York. [7]J. J. B. Hilliard & Son, Louisville, Ky. [8]Dillon, Read & Co., Chicago, Ill. [9]A. E. White Co., San Francisco, Calif. [10]Lee Higginson & Co., Boston and Chicago. [11]J. W. Jakes & Co., Nashville, Tenn. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [13]Stern Bros. & Co., Kansas City, Mo. [14]First Wisconsin Co., Milwaukee, Wis. [15]Central-Republic Company, Chicago, Ill. [16]G. M. P. Murphy & Co., Baltimore, Md. [17]Citizens Southern Co., Savannah, Ga. [18]Dean, Witter & Co., Los Angeles, Calif. [19]Hewitt, Ladin & Co., New York. [20]Tucker, Hunter, Dulin & Co., San Francisco, Calif. [21]Baker, Simonds & Co., Inc., Detroit, Mich. [22]Peoples-Pittsburgh Trust Co., Pittsburgh, Penn. [23]Howard R. Taylor & Co., Baltimore. [24]Richards & Co., Philadelphia, Penn. [25]Hincks Bros. & Co., Bridgeport, Conn. [26]Bank of Republic, Chicago, Ill. [28]Chicago Trust Co., Chicago, Ill. [29]Boettcher-Newton & Co., Denver. [30]Hanson and Hanson, New York. [31]S. F. Holzinger & Co., Milwaukee, Wis. [32]Tobey and Kirk, New York. [33]Steiner, Rouse and Co., New York. [34]Jones, Heward & Co., Montreal, Que. [35]Tenney, Williams & Co., Los Angeles, Calif. [36]Stein Bros. & Boyce, Baltimore, Md. [37]Wise, Hobbs & Arnold, Boston. [38]E. W. Hays & Co., Louisville, Ky. [39]Blythe Witter & Co., Chicago, Ill. [40]Martin Judge Co., San Francisco, Calif. [41]A. J. Pattison Jr. & Co., Ltd., Toronto, Canada. [42]Nesbitt, Thompson & Co., Toronto. [44]E. H. Rollins, Chicago. [45]Dunlap, Wakefield & Co., Louisville, Ky. [46]First Union Trust & Savings Bank, Chicago. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hemphill, Noyes and Co., New York City.

# Financial News in Brief

**Wolverine Portland Cement Co.**, Coldwater, Mich., has issued the following balance sheet and operating statement for year ending December 31, 1932:

ASSETS OF THE WOLVERINE PORTLAND CEMENT CO.

| | | | |
|---|---|---|---|
| Current: | | | |
| Cash | | | $ 91,416.82 |
| Marketable investments (market value) | | | 15,185.00 |
| Notes and accounts receivable—customers | $ 36,691.90 | | |
| Less: Reserve for losses and discounts | 6,422.80 | | 30,269.10 |
| Inventories | | | 180,598.62 |
| Total current assets | | | $317,469.54 |
| Fixed: | | | |
| Land, clay and marl deposits | $ 144,133.05 | | |
| Less: Reserve for depletion | 91,220.06 | $ 52,912.99 | |
| Plant and equipment | $1,463,264.59 | | |
| Less: Reserve for depreciation | 906,858.22 | 556,406.37 | |
| Total fixed assets | | | $609,319.36 |
| Other assets: | | | |
| Deferred operating expenses and advances | | $ 17,603.47 | |
| Cash in bank—withdrawal restricted | | 634.23 | |
| Total other assets | | | 18,237.70 |
| Total assets | | | $945,026.60 |

LIABILITIES OF THE WOLVERINE PORTLAND CEMENT CO.

| | | |
|---|---|---|
| Current: | | |
| Accounts payable | $ 7,000.96 | |
| Accrued liabilities (taxes, wages and unclaimed dividends) | 11,829.10 | |
| Total liabilities | | 18,830.06 |
| Capital stock: Common stock (par value $10), 100,000 shares | 1,000,000.00 | |
| Operating deficit | 73,803.46 | |
| Total capital | | 926,196.54 |
| Total liabilities and capital | | $945,026.60 |

CONDENSED OPERATING STATEMENT

| | | |
|---|---|---|
| Net sales | $212,956.20 | |
| Cost of goods sold | 214,943.39 | |
| Gross profit | | $ 1,987.19 |
| Selling expenses | $ 17,769.00 | |
| Administrative and general expenses | 20,129.74 | 37,898.74 |
| Operating loss | | 39,885.93 |
| Non-operating charges: | | |
| Taxes on non-operating plant | $ 4,476.90 | |
| Less: Non-operating income | 3,761.41 | |
| Net non-operating charges | | 715.49 |
| Loss | | $ 40,601.42 |
| Depreciation | $ 58,191.29 | |
| Depletion | 2,237.07 | |
| Total depreciation and depletion | | 60,428.36 |
| Net loss for year | | $101,029.78 |

STATEMENT OF OPERATING DEFICIT

| | | |
|---|---|---|
| Surplus balance—January 1, 1932 | | $ 32,585.07 |
| Deductions: | | |
| Net loss for year | $101,029.78 | |
| Increase in reserve for market—Decline in investments | 5,358.75 | 106,388.53 |
| Operating deficit—December 31, 1932 | | $ 73,803.46 |

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## Recent Dividends Announced

| | | |
|---|---|---|
| Alpha Portland Cement Co. 7% pfd. (qu.) | $1.75 | March 15 |
| Calaveras Cement Co. 7% pfd. (qu.) | 1.75 | April 15 |
| Ideal Cement Co. Com. (qu.) | 0.25 | April 1 |
| National Gypsum Co. 7% pfd. (qu.) | 1.75 | April 1 |
| Superior Portland Cement A (qu.) | 0.27½ | April 1 |
| U. S. Gypsum Com. (qu.) | 0.25 | April 1 |
| U. S. Gypsum pfd. (qu.) | 1.75 | April 1 |

## Portland Cement Production in February

THE PORTLAND CEMENT INDUSTRY in February, 1933, produced 2,772,000 bbl., shipped 2,275,000 bbl. from the mills, and had in stock at the end of the month 21,121,000 bbl. Production of portland cement in February, 1933, showed a decrease of 30.2% and shipments a decrease of 27.0%, as compared with February, 1932. Portland cement stocks at mills were 20.8% lower than a year ago.

The statistics here given are compiled from reports for February, received by the Bureau of Mines, from all manufacturing plants except four, for which estimates have been included in lieu of actual returns.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 165 plants both at the close of February, 1933, and of 1932.

RATIO (PER CENT) OF PRODUCTION TO CAPACITY

| | February 1932 | February 1933 | Jan. 1933 | Dec. 1932 | Nov. 1932 |
|---|---|---|---|---|---|
| The month | 18.7 | 13.4 | 12.9 | 18.5 | 29.1 |
| The 12 months ended | 45.2 | 27.1 | 27.6 | 28.3 | 29.0 |

◆ ◆ ◆

**Missouri Portland Cement Co.**, St. Louis, Mo., and wholly owned subsidiary report the following condensed consolidated balance sheet at the close of business December 31, 1932:

◆ ◆ ◆

ASSETS OF THE MISSOURI PORTLAND CEMENT CO.

| | | | |
|---|---|---|---|
| Land, buildings and equipment—Book values, less depreciation and depletion | | | $ 9,287,987.28 |
| Good will, trade-marks, trade brands, trade names, etc. | | | 1.00 |
| Current: | | | |
| Cash | | $ 214,352.57 | |
| U. S. Treasury certificates (par value $35,000) | | 34,870.57 | |
| Call loan—secured by collateral | | 20,000.00 | |
| Customer's note receivable | | 1,500.00 | |
| Customers' accounts receivable, less allowance for doubtful discount and freight | | 78,711.34 | |
| Sundry current accounts receivable | | 2,919.36 | |
| Accrued income | | 1,125.38 | |
| Inventories: | | | |
| Manufactured cement | $ 272,977.14 | | |
| Clinker (cement in process) | 22,948.59 | | |
| Other merchandise | 53,722.76 | | |
| Miscellaneous stores, supplies, etc. | 399,612.37 | | |
| Cement sacks | 119,799.55 | 869,060.41 | 1,222,539.63 |
| Sundry notes, accounts, claims, etc. | | | 255,802.74 |
| Sundry securities | | | 147,070.00 |
| Deferred | | | 102,542.06 |
| | | | $11,015,942.71 |

LIABILITIES OF THE MISSOURI PORTLAND CEMENT CO.

| | | | |
|---|---|---|---|
| Current: | | | |
| Note payable—for money borrowed from bank | | $ 150,000.00 | |
| Accounts payable | | 28,682.49 | |
| Accrued local taxes and sundry expenses | | 14,144.62 | $ 192,827.11 |
| Reserve for sack redemption | | | 18,717.16 |
| Other reserves | | | 108,266.74 |
| Capital stock and surplus: | | | |
| Capital stock: Authorized, 360,000 shares | $9,000,000.00 | | |
| Less: Unissued 60,716 shares | $1,517,900.00 | | |
| In treasury, 16,091 shares | 402,275.00 | 1,920,175.00 | $7,079,825.00 |
| Surplus: | | | |
| Capital surplus—discount on purchased treasury stock | | 126,172.62 | |
| Appropriated surplus | | 1,500,000.00 | |
| Unappropriated surplus: Balance December 31, 1931 | $2,651,924.75 | | |
| Add: Excess of book value of assets received in liquidation of subsidiary over carrying value of stock | 156,393.94 | | |
| | $2,808,318.69 | | |
| Deduct: | | | |
| Loss, year ended December 31, 1932 | $207,975.17 | | |
| Depreciation and depletion | 538,525.94 | | |
| Net loss for the year | $746,501.11 | | |
| Cash dividend January 30, 1932 | 71,683.50 | 818,184.61 | 1,990,134.08 10,696,131.70 |
| | | | $11,015,942.71 |

# TRAFFIC and TRANSPORTATION

## Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to the week ending March 18:

### New England

28502. **Limestone, agricultural,** minimum weight 50,000 lb., from Canaan, Conn., to Albany, N. Y., and stations on D. & H. Co., D. L. & W. R. R., Erie R. R., L. & H. Ry., N. Y. C. R. R. and N. Y. O. & W. Ry., named in N. Y. N. H. & H. R. R., I. C. C. F3135 (Item Nos. 1160 and 1165), and I. C. C. No. F3159. Proposed—Same rates as are currently effective from West Stockbridge, Mass., as per N. Y. N. H. & H. R. R., I. C. C. Nos. F3135 and 3159.

### Trunk Line

30502. **Ground limestone,** carloads, minimum weight 50,000 lb., from Rambo, Penn., to Bowmanville, Guelph, Galt, Kitchener, Peterboro, Toronto, Ont., 25c; Ottawa, Ont., 22c; Pembroke, Ont., 27c, and Bertheirville, Que., 23½c per 100 lb.

30512. **Building sand,** loaded in open top cars, carloads (See Note 2), from Berkeley Springs, Great Cacapon and Hancock, W. Va., to Curtis Bay (Baltimore), Md., B. & O. R. R. delivery only, and Locust Point (Baltimore), Md., B. & O. R. R. delivery only $1 per net ton. To apply as a proportional rate on traffic destined to points on the Pacific Coast of the United States, Alaska and British Columbia, and moving via the Panama Canal. (Present rate, $1.30.)

30513. **Crushed stone,** carloads (See Note 2), from Grove, Md., $1.50; Engle, W. Va., Martinsburg, W. Va., $1.60, to (C. B. Ry.) Owings, Md., Chesapeake Beach, Md.

30535. **Ground limestone,** carload, minimum weight 50,000 lb., from Howes Cave, N. Y., to Unadilla Valley Railway stations 10c per 100 lb.

30540. **Limestone, unburned, ground,** carload, minimum weight 50,000 lb., from Gasport, N. Y., to Tompkins and Nelson, Penn., $1.70, Elkland, Osceola, Academy Corners, Knoxville, Phillips, Cowanesque and Westfield, Penn., $1.80, Potter Brook, Tannery, Harrison Valley, Mills and Ulysses $1.95 per net ton.

30547. To increase rate from 45c to 60c per net ton on **stone, crushed, coated with oil, tar or asphaltum,** carload; **stone, crushed, other than coated with oil, tar or asphaltum,** carload, minimum weight 40,000 lb., from Port Norfolk, Va., to Eastville, Va.

30549. **Crushed stone,** carload (See Note 2), from Jamesville and Rock Cut, N. Y., to Hollisters, Penn., $1.20 per net ton. (Present rate is $1.30.)

30551 (increase). **Ground limestone,** carload, minimum weight 50,000 lb., from Exmore to Cheriton, Va., 13.

30552. **Ground limestone,** carload, minimum weight 50,000 lb., from Knickerbocker, Howellville, Rambo, Plymouth Meeting, Blue Bell, Devault, Swedesford, Union Stone Co., Billmyer, Bainbridge, Rheems and York stations, Penn., to Fordham, N. Y., 19c per 100 lb.

30553. **Ground limestone,** carload, minimum weight 50,000 lb., to Union Stone Co., Penn., Rheems and Temple, Penn., 9c; Ashcom, Penn., 10c; Baltimore Stations, Md., 9½c; Avondale, Penn., 7c; Texas and Cockeysville, Md., and York to York Fair Grounds, Penn., 9c; Spring Grove to Hanover, Penn., and Union Bridge to Frederick, Md., 9½c; Campbell to Wrightsville, Penn., and Godorus Mills, Myers Mill and Emigsville, Penn., 9c; Lemoyne, Penn., 9½c; Williamson, Penn., 10c; Falling Waters and Berkeley, W. Va., and Martinsburg and Bunker Hill, W. Va., 10c; Lebanon, Penn., 7½c.

30556. **Ground limestone,** carloads, minimum weight 50,000 lb., from Howes Cave, N. Y., to Bronxville to Millerton, N. Y., incl., 13½c; Mount Riga to Ghent, N. Y., incl., 12½c, and Dunwoodie, N. Y., to Tilly Foster, N. Y., incl., 13½c per 100 lb.

30557. **Stone, natural, crushed or broken,** uncoated or coated with tar, asphaltum or oil, carloads (See Note 2), from Oriskany Falls, N. Y., to N. Y. C. R. R. stations—Solvay, Auburn, Daysville, Hannibal, Dexter, Harrisville, Newton Falls, Clayton, Ogdensburg, Emeryville, Potsdam, Massena, Floodwood, Malone, Constable, Bay Pond, Brandon, St. Regis Falls, Nyando and various. Rates ranging from $1.10 to $2 per net ton.

M-3187. To establish 20% of first class rating on **crushed stone or crushed marble** (terrazzo aggregate), in bulk or in bags, in box cars, carloads, minimum weight 60,000 lb., from Springwood, Va., to Trunk Line, Central Freight and New England Freight Association territories.

30565. **All sand** (except ground or pulverized sand) and **gravel,** carload, in box cars, or other closed equipment, and (2) **high silica sand** (containing not less than 95% silica) in open top equipment; **molding** (naturally bonded), **sand** in open top equipment; **core sand** in open top equipment; and on other sand in open top equipment; and **gravel,** carload (See Note 2), from Flanders, N. J., to Florence, N. J., and Burlington, N. J., (1) $1.60 per net ton and (2) $1.40 per net ton.

30571. **Refuse limestone, ground,** carloads (See Note 2), from Pleasantville, N. Y., to Brooklyn, N. Y., stations, viz., Wallabout Basin, Brooklyn Eastern District Terminal, Jay Street Terminal, Fulton Terminal, Atlantic Terminal, Bush Docks and New York Lighterage, N. Y., $2.10 per net ton.

**Note 1—Minimum weight marked capacity of car.**

**Note 2—Minimum weight 90% of marked capacity of car.**

**Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.**

30502. **Ground limestone,** carloads, minimum weight 50,000 lb., from York, Penn., Exton, Swatara, Swedeland, Williams and Plymouth Meeting, Penn., to Bowmansville, Guelph, Galt, Kitchener, Peterboro and Toronto, Ont., 25c; Ottawa, Ont, 22c; Pembroke, Ont., 27c, and Bertheirville, Que., 23½c per 100 lb.

30552. **Ground limestone,** carloads, minimum weight 50,000 lb., from Hummelstown and Swatara, Penn., to Fordham, N. Y., 19c per 100 lb.

30578. To increase rate of 80c to $1 per net ton on **sand** (except blast, core, engine, foundry, glass, moulding, quartz, silex or silica) and **gravel,** in straight or mixed carloads (See Note 2), from Machias, N. Y., to Bradford, Penn.

30582. **Crushed stone,** carloads (See Note 2), from LeRoy, N. Y., and Stafford, N. Y., to Elmira and Elmira Heights, N. Y., $1.10 per net ton. Present rate $1.20.

M-3200. **Crushed stone, coated with tar, oil or asphaltum,** carloads (See Note 2), from Roanoke, Marion, Va., and Hagerstown (Security), Md., to points in Official Classification territory. Scale of rates ranging from 15 mi. and under, single line hauls 70c, joint line hauls 90c per net ton, to scale of rates ranging from 530 mi. to 560 mi., single line haul $2.60, and joint line hauls $3.

### Central

34769. To establish on **stone, raw or crude, crushed, ground or pulverized** (unburned), in box cars, carloads, minimum weight 60,000 lb., from Bettsville, Gibsonburg, Maple Grove and Woodville, O., to Alexandria, Ind., rate of 180c per net ton. Present, 220c. (Limestone, ground or pulverized, minimum weight 50,000 lb.)

34773. To establish on **agricultural limestone,** carloads, minimum weight 50,000 lb., from Gibsonburg and Woodville, O., to Lafayette, Ind., rate of 230c per net ton, plus emergency charge. Present rate, 260c.

34878. To establish on **sand** and **gravel,** in open top cars, carloads, from Dayton, O., to C. G. R. R. and F. B. R. R. stations, viz., Coney Island, 90c; Forestville, Summerside, 95c; Hamlet, Bethel, 100c; Georgetown, 105c; Russellville, 115c; Felicity, O., 105c per net ton (reductions).

34879. To establish on **sand** (except blast, core, engine, filter, fire or furnace foundry, glass, grinding or polishing, loam moulding or silica) and **gravel,** carloads, from Richmond, Ind., to Rushville, Ind., rate of 55c per net ton. Present—70c.

34934. To establish on **crushed stone,** in bulk, in open top cars, carloads, from Kenneth, Ind., to South Bend, Ind., rate of 65c per net ton. Present—84c.

34935. To establish on **agricultural limestone,** unburned; **stone, crushed, stone screenings,** in bulk, in open top cars, carloads, from Spencer, Ind., to Omaha, Ill., rate of 121c per net ton, via P. R. R., Vincennes, Ind., B. & O. R. R. Present—360c per net ton, per C. F. A. L. Tariff No. 486.

34936. To establish on **crushed stone,** carloads, from Chicago, Ill., to New Albany, Ind., rate of 125c per net ton. Present 265c.

34967. To establish on **crushed stone, crushed stone screenings and agricultural limestone** (not ground or pulverized), in bulk in open top cars, carloads, from Narlo, O., to Middletown, O., rate of 100c, and to Cincinnati, O., 110c per net ton. Present rate—140c.

34968. To establish on **ground, pulverized or agricultural limestone,** in bags or in bulk, in box cars, in straight carloads, minimum weight 60,000 lb., from Chicago, Ill., to points on the N. Y. C. R. R., rates to representative points as follows: South Bend, Ind., 150c; Sturgis, Mich., 160c; Quincy, Mich., 165c; Adrian, Mich., 180c; Three Rivers, Mich., 160c; Kalamazoo, Mich., 165c; Grand Rapids, Mich., 180c; Deerfield, Mich., 180c; Detroit, Mich., 195c; Lansing, Mich., 185c; Jackson, Mich., 175c; Ypsilanti, Mich., 185c. (Reductions.)

34969. To establish on **stone, crushed** (in bulk), **crushed stone screenings** (in bulk), and **limestone, unburned, agricultural** (in bulk in open top cars), carloads, from Carey, O., to points in Indiana and Ohio rates as shown. Rates in cents per net ton to representative points:

**From Carey, O.**

| | (A) | (B) | (F) |
|---|---|---|---|
| (N. Y. C. Stations) | | | |
| Kendallville, Ind. | 125 | 180 | 1 |
| | 115 | 340 | 10 |
| South Bend, Ind. | 155 | 155 | 1 |
| | 145 | 380 | 9 |
| Gary, Ind. | 165 | 460 | 9 |
| | 175 | ..... | 1 |
| Hammond, Ind. | 185 | ..... | 5 |
| | 165 | 460 | 4 |
| | 165 | ..... | 9 |
| Shelby, Ind. | 155 | 420 | 2 |
| | 185 | ..... | 5 |
| Alexandria, Ind. | 135 | 176 | 4 |
| | 145 | 360 | 20 |
| (Erie Stations) | | | |
| Akron, O. | 145 | 360 | 21 |
| | 135 | 172 | 11 |
| (P. R. R. Stations) | | | |
| Avilla, Ind. | 125 | 320 | 9 |
| | 115 | ..... | 17 |
| (Wabash Stations) | | | |
| Napoleon, O. | 110 | 240 | 8 |

(A)—Proposed rate.

(B)—Present rates, 6th class except as noted Jones' I. C. C. 2445.

(F)—Route number see key to routing below.

**Routing**

1—C. & O. Ry., Toledo, O., and N. Y. C. R. R. 2—C. & O. Ry., Fostoria, O., and N. Y. C. & St. L. R. R., Knox, Ind., N. Y. C. R. R. 4—C. & O. Ry., Fostoria, O., N. Y. C. & St. L. R. R. 5—C. & O. Ry., Fostoria, O., N. Y. C. & St. L. R. R., South Wanatah, Ind. C. I. & L. R. 8—C. & O. Ry., Toledo, O., Wabash Ry. 9—C. & O. Ry., Upper Sandusky, O., P. R. R. 10—C. & O. Ry., Fostoria, O., B. & O. R. R., Avilla, Ind., P. R. R. 11—C. & O. Ry., Upper Sandusky, O., P. R. R., Winona Lake, Ind., Winona R. R. 17—C. & O. Ry., Fostoria, O., B. & O. R. R. 20—C. & O. Ry, Marion, O., C. C. C. & St. L. Ry.; and 21—C. & O. Ry., Erie R. R.

34971. To establish on **crushed stone,** in open top cars, carloads, from Carey and McVittys, O., to Lathrop, O., rate of 130c per net ton, plus emergency charge. Present, 145c.

34973. To establish on **roofing granules,** carloads, minimum weight 60,000 lb., from Copley, O. To representative points.

| | Prop. | | Prop. |
|---|---|---|---|
| Argo, Ill. | 270 | Kansas City, Mo. | 504 |
| Carthage, O. | 230 | Baltimore, Md. | 340 |
| Chicago, Ill. | 270 | Boston, Mass. | 500 |
| Cincinnati, O. | 230 | E. Walpole, Mass. | 500 |
| Cleveland, O. | 100 | Economy, Penn. | 189 |
| Detroit, Mich. | 216 | Jersey City, N. J. | 400 |
| E. St. Louis, Ill. | 360 | Lockport, N. Y. | 280 |
| Erie, Penn. | 189 | Millis, Mass. | 500 |
| Franklin (War Co.), O. | 230 | New York, N. Y. | 400 |
| Grand Rapids, Mich. | 250 | Niagara Falls, N. Y. | 280 |
| Lockland, O. | 230 | Philadelphia, Penn. | 360 |
| Marseilles, Ill. | 290 | York, Penn. | 340 |
| Porter, Ind. | 270 | Brantford, Ont. | 346 |
| South Bend, Ind. | 250 | Danville, Que. | 500 |
| Vandalia, Ill. | 360 | Hamilton, Ont. | 346 |
| Wilmington, Ill. | 290 | W. Toronto, Ont. | 346 |

Plus emergency charge.

Present rates—No rates in effect account commodity not listed in Classification.

34990. To establish on **crushed stone, crushed stone screenings and agricultural limestone** (not ground or pulverized), in bulk, in open top cars, carloads, from Narlo, O., to points in Indiana, rates as shown.

**From Narlo, O.**

| To (rep. pts.) | Present rates | Proposed rates | Route |
|---|---|---|---|
| La Porte, Ind. | | | |
| N. Y. C. | *400 | 155 | (7) |
| N. Y. C. & St. L. | 155 | 145 | (3) |
| Walkerton, Ind. | | | |
| B. & O. | 173 | 135 | (4) |
| N. Y. C. & St. L. | 150 | 145 | (3) |
| N. Y. C. | 150 | 145 | (8) |
| Marion, Ind. | | | |
| C. C. C. & St. L. | *360 | 145 | (6) |
| N. Y. C. & St. L. | ‡145 | 135 | (3) |

| | | | |
|---|---|---|---|
| Milford Jct., Ind. | | | |
| B. & O. | 161 | 125 | (4) |
| C. C. C. & St. L. | 145 | 135 | (6) |
| Auburn, Ind. | | | |
| B. & O. | 127 | 110 | (4) |
| N. Y. C. | ‡130 | 115 | (7) |
| Otis, Ind. | | | |
| C. I. & L. | *420 | 155 | (5) |
| N. Y. C. | *420 | 165 | (7) |
| San Pierre, Ind. | | | |
| C. I. & L. | *400 | 155 | (5) |
| N. Y. C. | *400 | 145 | (8) |
| North Judson, Ind. | | | |
| Erie | *400 | 155 | (10) |
| N. Y. C. | 150 | 145 | (8) |

*Present 6th class converted to per ton basis.
‡Intermediate rate, not specifically published.

**Route**

(3) Via N. Y. C. & St. L. R. R. direct.

(4) Via N. Y. C. & St. L. R. R., Fostoria, O., and B. & O. R. R.

(5) Via N. Y. C. & St. L. R. R., So. Wanatah, Ind., and C. I. & L. Ry.

(6) Via N. Y. C. & St. L. R. R., Claypool, Ind., and C. C. C. & St. L. Ry.

(7) Via N. Y. C. & St. L. R. R., Ft. Wayne, Ind., and N. Y. C. R. R.

(8) Via N. Y. C. & St. L. R. R., Knox, Ind., and N. Y. C. R. R.

(10) Via N. Y. C. & St. L. R. R., Ohio City, O., and Erie R. R.

34856. To establish on **crushed stone,** carloads, from Melvin, O., to Guysville, Steward, Coolville and Torch Hill, O., rate of 90c per net ton, plus emergency charge (reduction).

35007. To establish on **crushed stone and crushed stone screenings,** carloads, minimum weight, from Marblehead, O., to Maximo, O., rate of 140c per net ton. Present, 90c.

35051. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry glass, grinding or polishing, loam, moulding or silica) and **gravel,** carloads, in open top cars, from Kenneth and Lake Ciecott, Ind., to Wheatfield, 90c; Bremen, 100c; La Paz and Union Centre, Ind., 101c per net ton. (Reductions.)

35081. To establish on **bituminous asphalt rock,** crude, crushed or ground (See Note 3), from East St. Louis, Ill. (applicable on traffic originating at points in Missouri) to Boston, Mass., 560c; New York, N. Y., 540c; Albany, N. Y., 520c; Syracuse, N. Y., 460c; Trenton, N. J., 520c; Philadelphia, Penn., 520c; York, Harrisburg, Penn., Washington, D. C., Baltimore, Md., 480c; Richmond, Va., 500c per net ton. (Reductions.)

## Southern

558. **Sand, gravel,** etc., from Montgomery, Ala., to South Georgia Ry. stations. It is proposed to establish reduced rates of 150c per net ton on sand, gravel and related commodities, as described in Agent Speiden's Freight Tariff 388-A, from Montgomery, Ala., to South Georgia Ry. stations, viz., Headly, Spain, Fodie, Shiver and Ilco, Ga. —made not higher than rates to Morven or Quitman, Ga., stations located on either side.

574. **Limestone, ground or pulverized,** carloads, Krause, Ill., to points in Mississippi Valley territory. It is proposed to establish rates on limestone, ground or pulverized, loaded in open top equipment, carloads (See Note 3), from Krause, Ill., to points on the N. C. & St. L. Ry., L. & N. R. R., Sou. Ry., G. M. & N. R. R., St. L.-S. F. Ry., and C. & G. Ry. in Kentucky, Tennessee and Mississippi, based on scale as shown on page 13 of Agent Spieden's F. T. No. 227-B, I. C. C. 1676, applicable between points south of the Ohio river.

745. **Sand and gravel,** carloads, Louisville, Ky., and Cincinnati, O., to Ohio and Ky. Ry. stations in straight or mixed carloads (See Note 3), from and to above named points. Rates in cents per net ton:

| To | From Louisville | From Cincinnati |
|---|---|---|
| Hays, Ky. | 150 | 150 |
| Lee City, Ky. | 150 | 150 |
| Lewis, Ky. | 160 | 160 |
| Index, Ky. | 160 | 160 |

## Illinois

1630-B. To amend C. F. A. Tariff 420-E, naming rates on **crushed stone, sand, gravel, etc.,** to provide an application for account of the C. M. St. P. & P. R. R. to the effect that rates named therein will also apply on black dirt.

7153. **Stone,** carloads (See Note 3), but not less than 40,000 lb., viz., crushed, broken, chip, rip rap and/or rubble, in open cars, in straight or mixed carloads, from Chisco, Ill., to Coulterville, Ill. Rates per net ton. Present, $1.13; proposed, 70c.

7149. **Ground limestone,** carload (See Note 2), from LaSalle, Ill. (rates per net ton). (Reductions.)

| To | Prop. |
|---|---|
| Chicago (local) | $0.75 |
| Chicago (C/L delivery) | .95 |
| E. Moline, Ill. | .88 |
| Joliet, Ill. | .75 |
| Moline, Ill. | .88 |

7156. **Crushed or ground limestone,** carload (See Note 2) from LaSalle, Ill., to points in Illinois. Rates in cents per net ton:

| To | Present | Proposed |
|---|---|---|
| Bloomington | * | 88 |
| Centralia | * | 100 |
| Champaign | * | 104 |
| Decatur | * | 88 |
| Dixon | * | 90 |
| E. St. Louis | * | 126 |
| Freeport | * | 100 |
| Kankakee | * | 101 |
| Litchfield | * | 126 |
| Mattoon | * | 114 |
| Mendota | * | 70 |
| Rockford | * | 106 |

*Class rates.

7144-A. **Sand and gravel,** carloads, from Joliet, Ill., to Beardstown, Ill. Rates per net ton: Present $1.13. Proposed—$1.01, to expire Aug. 15, 1933. (Plus emergency charge.)

7166. **Sand and gravel,** carloads (See Note 2), but not less than 40,000 lb. Rates per net ton:

| From | Present | Proposed |
|---|---|---|
| Metropolis, Ill., to Benton, Ill. | $ .92 | $ .95 |
| Joppa, Ill., to Waltonville, Ill. | .95 | 1.00 |
| Joppa, Ill., to Woodlawn, Ill. | .95 | 1.00 |

7170. **Traffic bound surface gravel** passing through 1-in. screen, carloads (See Note 1), from Joliet, Ill., to Verona, Ill., and intermediate points. Present—76c plus emergency charge. Proposed—39c plus emergency charge.

3058-A. **Sand and gravel,** carloads (See Note 3), from La Grange, Mo., to Meredosia, Ill., and points intermediate on Wabash Ry. Rates per net ton. Present—88c. Proposed—76c.

7174. **Sand,** carloads (See Note 3), but not less than 60,000 lb., from East Carondelet, Ill., to stations on M. & O. R. R. in Illinois. Rates per net ton:

| To (Rep.) | Present | Proposed |
|---|---|---|
| E. St. Louis | 95 | 80 |
| Waterloo | 80 | 70 |
| Eden Mine | 85 | 75 |
| Murphysboro | 90 | 80 |
| Cairo | 105 | 105 |

7178. **Sand and gravel,** carloads, other than high grade, from Ottawa, Ill., to Tiskilwa, Ill. Present—82. Proposed—Sand, 50; gravel, 60.

7184. **Crushed stone screenings,** carloads, from Joliet, Ill., to Streator, Ill. Present—76. Proposed—63. Plus emergency charge.

7190. **Sand gravel,** carloads, from Joliet, Ill., to Heyworth, Ill. (See Note 3), but in no case will the minimum weight be less than 60,000 lb. Rates per net ton. Present—$1.01. Proposed—88c.

Revision of interterritorial rates between Ohio River-Mississippi Valley and Southern Freight Association territories on commodities listed below are under consideration and the views of the public are solicited concerning them.

Full details of features in connection therewith and time of public hearings, commencing 10 a. m., Tuesday, March 28, 1933, Gibson Hotel, Cincinnati, O., appeared under Joint Conference Docket No. 30, in the Traffic Bulletin, March 11.

28723. To add Hills Grove, R. I., as a point of origin to Items 2002-E and 2003, N. Y. N. H. & H. R. R. I. C. C. F-3135, providing rate of 18½c per 100 lb. on **core sand,** carloads (See Note 2), from Davisville, Wickford Jct., R. I., and other N. H. R. R. stations to Trunk Line territory. Present, sixth class rates.

## Western

8314. Rates, **sand, gravel and stone, crushed,** carload, minimum weight as published in W. T. L. Tariff 210 and S. W. L. Tariff 162-E, J. E. Johanson's I. C. C. 2432, from points in Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas, to Soldiers' Home, Kan. Rates, present, actual distance; proposed, add the following to Item 160, S. W. L. Tariff 162-E and Item 250, W. T. L. Tariff 210: "Rates authorized under this item as applicable on sand, gravel or crushed stone, carloads, to Leavenworth, Kan., will also apply to Soldiers' Home, Kan., on the A. T. & S. F. Ry. and be applied as maximum at intermediate points."

8314. Rates, **sand, gravel and stone, crushed,** carload, minimum weight as published in W. T. L. Tariff 210 and S. W. L. Tariff 162-E, J. E. Johanson's I. C. C. 2432, from points in Arkansas, Kansas, Louisiana, Missouri, Oklahoma and Texas, to Soldiers' Home, Kan.

7012-2. **Sand, silica,** other than ground or pulverized, in box cars or in open top cars (See Note 3), from Ottawa, Utica and Wedron, Ill., district to Eastern destinations below specified.

| To | Prop. |
|---|---|
| Ottawa, Ill. | .75 |
| Peoria, Ill. | .88 |
| Rock Island, Ill. | .88 |
| Silvis, Ill. | .88 |
| Davenport, Ia. | 1.01 |

Proposed: Detroit, Mich., $2.40, including emergency charge of 6c per ton; Toledo, O., $2.40, including emergency charge; Cleveland, O., $2.40, including emergency charge; and Buffalo, N. Y., *$3.01, including emergency charge.

*Also to apply to district points, such as Lockport, Niagara Falls, Lancaster, etc.

## Southwestern

436. **Limestone, ground,** from, to and between points in S. W. F. B. territory. To amend Item 10, S. W. L. Tariff No. 162E, by eliminating the words "in bulk or in bags" shown in connection with reference to ground limestone.

438. **Sand and gravel,** minimum weight on, between points in Oklahoma. To establish following rule in S. W. L. Tariff 162E: "When track scale is not available at point of origin or destination and shipment does not pass track scale en route, the weight of 10% above marked capacity of car will be applied, except upon presentation of original or certified copy of invoice showing actual weight, or certificate of weigher by shipper or consignee. Subject to Item No. 15."

## Joint Conference

Docket S. F. A. No. 1928. **Chert, sand and gravel,** interterritorially between points in S. F. A. territory, on the one hand, and Official Classification (including I. F. A. territory), on the other. It is suggested that all existing commodity rates and classification exceptions, be cancelled, except:

1—That rates now carried in Agent Glenn's Series 88 tariff be continued.

2—That existing rates from Ottawa, Ill., district to points in Southern territory be continued.

3—That through commodity rates on sand from Crossley, Fla., to points in Official Classification territory be continued.

4—That existing rate on gravel, carloads, from Charlotte, N. C., to Baltimore, Md., be continued.

## Proposed I. C. C. Decisions

**25429. Cement.** Signal Mountain Portland Cement Co. vs. Alcolu et al. Dismissal proposed. Rates, cement, Chattanooga, Tenn., to destinations in the Carolinas, not unreasonable or otherwise unlawful.

**25557. Cement.** North American Cement Corp. vs. N. Y. C. et al. Rate, interstate shipments, cement, Alsen, N. Y., to Harlem River Transfer, N. Y., unreasonable but not otherwise unlawful to the extent it exceeded or may exceed 12.5 c. New rate and reparation proposed.

## Refuse Readjustment of Cement Rates

SOUTHERN California cement plants lost their fight for an adjustment of shipping rates when the state railroad commission handed down a decision favoring the Southern Pacific and Santa Fe railroads.

The companies had complained about an asserted differential in rates between the plants at Colton and Riverside as compared with plants at Victorville and Monolith.

In its decision the commission said: "In times like these the commission should not hamper carriers in their voluntary effort to meet existing conditions so long as there is no evidence of unjust discrimination."—*Riverside* (Calif.) *Enterprise.*

## Extend Emergency Freight Rates Six Months

THE Interstate Commerce Commission announces that freight rate increases under the so-called 15% increase case are extended to September 30. The commission said surcharges as such should be brought to an end, but felt a reasonable period should be allowed carriers to file tariffs in the usual way, proposing such readjustments in their rates as they can justify. In view of this the commission will permit blanket tariffs to become effective on short notice without suspension.

## Cement Manufacturers Optimistic

A TELEGRAPHIC SURVEY of conditions in every section of the country, made March 19 by the Portland Cement Association, revealed an extraordinary improvement in confidence and a belief on the part of cement executives that improved business can be expected shortly. This news release was used in many newspapers throughout the country.

The survey covered every major cement center and was made to determine how rapidly the Cement Association should speed up the enlarged promotion program on which it has been working since last November. Nine new uses of concrete are being pushed, in addition to all of the older markets.

"The reports show that America is again on the march," said Edward J. Mehren, president of the Portland Cement Association, in giving out the results. "Our members are confident that the improved tone will result quickly in new business in consumer goods, and in due course will speed up construction, in which there has been a deficiency during the last three years.

"But selling must start before the product begins to move. Therefore, we shall at once increase the broadened promotion program taken in hand last November."

**Jos. S. Young,** president, Lehigh Portland Cement Co., reported "the financial situation is becoming more encouraging every minute and employment should show a gradual increase."

**H. Struckmann,** president, International Cement Corp.: "Business in general is responding to President Roosevelt's courageous and constructive policies in this section as it is elsewhere. I am certain that the chaos which has prevailed will soon be replaced by order and progress."

**Chas. F. Conn,** president, Giant Portland Cement Co.: "The East is on the way to better business."

**L. C. Newlands,** vice-president, Oregon Portland Cement Co.: "General feeling is greatly improved and Western revival of business is surely set to follow that of the East."

**E. P. Lucas,** president, Superior Portland Cement, Inc.: "Everybody locally is showing more confidence than for many, many days. I feel we are on the upgrade."

**John Treanor,** president, Riverside Cement Co.: "It is clearly evident that there is a very definite change of sentiment about future business."

**C. D. Nichols,** vice-president, Oklahoma Portland Cement Co.: "A feeling of confidence pervades all business activity in this section. Merchants report an increase in business in every line."

**H. L. Block,** president, Missouri Portland Cement Co.: "The return of confidence in this territory is very pronounced. Revival of the beer industry has given local people a definite hope for additional employment."

**L. T. Sunderland,** president, Ash Grove Lime and Portland Cement Co., reported that a high degree of confidence pervades his part of the middle-west. He cites as a factor that no bank there has yet been required to avail itself of any new currency.

**F. M. Traynor,** sales manager, Florida Portland Cement Co., and president of the Tampa Chamber of Commerce, said: "Florida is well on the way toward increased prosperity."

**J. B. John,** president, Medusa Portland Cement Co., asserts that complete confidence prevails in Cleveland and surrounding country.

**C. E. Ulrickson,** vice-president, Trinity Portland Cement Co., Dallas, declared: "A definite psychological movement is already apparent."

**C. Baumberger,** president, San Antonio Portland Cement Co., said that there all lines of business show increased activity.

**C. B. Condon,** secretary, Hawkeye Portland Cement Co., Des Moines, is of the opinion that the new confidence being expressed now will continue indefinitely.

Reports in a similar vein were received by Mr. Mehren from cement manufacturers in Charleston, S. C., Pittsburgh, San Francisco and Louisville.

### *Follow This Example—Assure Return of Prosperity!*

***THE International Cement Corp., New York City, is increasing compensation of hourly and weekly wage earners 10% at its mills in Pennsylvania, New York, Indiana and Kansas coincident with an advance of 10 c. per bbl. in the price of its product.—Announcement, March 21, 1933.***

***Follow this example, all you producers of rock products; and capital will be reaccumulated; buying will begin; prosperity will be restored!—The Editor.***

## Morris Kind

MORRIS KIND, 59, president of the Hercules Cement Corp., which he helped organize in 1917, died at his home in Bryn Mawr, Penn., March 15.

He was graduated from the University of Pennsylvania in 1896 and received a civil engineering degree there three years later.

Mr. Kind became affiliated with the cement company after entering the engineering business. For many years he was active in executive work of the Federation of Jewish Charities at Philadelphia. He was a member of the Manufacturers Country Club.—*New York* (N. Y.) *Times.*

## Sand-Lime Brick Production and Shipments in February

THE FOLLOWING DATA are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Fifteen sand-lime brick plants reported for the month of February, this number being three more than the number reporting for the month of January, statistics for which were published February 25.

***Average Prices for February***

| Shipping point | Plant price | Delivered |
|---|---|---|
| Dayton, Ohio | $ 9.00 | $10.00 |
| Detroit, Mich. | 9.00 | 10.00-11.50 |
| Flint, Mich. | 11.50 | 13.00 |
| Grand Rapids, Mich. | ..... | 12.50 |
| Madison, Wis. | 11.50 | 13.00 |
| Medfield, Mass. | 8.00 | 9.00-10.00 |
| Milwaukee, Wis. | 7.50 | 10.50 |
| Mishawaka, Ind. | 9.00 | ..... |
| Saginaw, Mich. | 10.00 | ..... |
| Syracuse, N. Y. | 18.00 | 20.00 |
| Toronto, Ont., Can. | 12.00 | 13.50 |

***Statistics for January and February***

| | †January | *February |
|---|---|---|
| Production | 605,540 | 307,000 |
| Shipments (rail) | 110,000 | 80,300 |
| Shipments (truck) | 1,233,254 | 777,810 |
| Stocks on hand | 4,621,930 | 4,020,459 |
| Unfilled orders | 7,325,000 | 4,812,000 |

*Fifteen plants reporting; incomplete, four not reporting unfilled orders.
†Twelve plants reporting; incomplete, three not reporting unfilled orders.

## Henry G. Barnhurst

HENRY G. BARNHURST, 60, died at the home of a friend in Chicago, March 18. He was apparently in good health, and passed away while asleep.

Mr. Barnhurst had been intimately associated with the development of the cement industry. In his early years he served both the Atlas Portland Cement Co. and the Lehigh Portland Cement Co. He also was construction engineer for the Mississippi Valley Portland Cement Co. and superintendent of the Diamond Portland Cement Co.

In 1906 he was made chief engineer of the Fuller Engineering Co., and was actively engaged in the designing and construction of cement plants, ore roasting and lime plants, and particularly in connection with development of use of powdered coal for all purposes. He secured a number of patents in these lines, and contributed many articles on these subjects.

At the time of his death he was sales representative of the middle west for the cement sales division of the Babcock and Wilcox Co. He had served for 29 years with this organization and its subsidiary, the Fuller-Lehigh Co., and its predecessor, the Fuller Engineering Co.

# Rock Products News Briefs

## Cement

PRETORIA Portland Cement Co., Ltd., Johannesburg, South Africa, has developed "Plasterlite," a light colored cement especially adapted to stucco work, and "Rapocrete," a high early strength cement.

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COPLAY Cement Manufacturing Co., Coplay, Penn., announces it is now manufacturing Saylor's waterproof cement with R.I.W. Toxement, ground integral at the mill. R.I.W. Toxement is a waterproofing compound which has been added to concrete on the job for waterproofing. This development of the Coplay company is in line with development of other cement manufacturers who are supplying special cement where waterproofed concrete is required.

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"MICHIGAN'S 'white elephant' Chelsea cement plant will reopen, bank moratorium not withstanding," the *Lansing* (Mich.) *Journal* recently stated. Over objection of several members of the administrative board, who pointed to the idle cement plants in the state, Secretary Abbott of the administrative board has rejected all cement bids, considering them too high. At the insistence of the attorney general, recommendation of Mr. Abbott is expected to result in the early opening of the plant at Chelsea, it is reported.

◆ ◆ ◆

IN AN ENDEAVOR to force construction of a cement plant in Arizona, Governor Moeur has suggested the highway commission consider the feasibility of establishing a state owned plant to provide materials for state construction jobs. Basis for his suggestion is that there are ample available raw cement materials in Arizona, though he fails to show what practical business men must consider—the possible market for the output of such a plant.

◆ ◆ ◆

BECAUSE 18 cement companies all bid the same, the new Indiana State Highway Commission has rejected all bids. Suggestions by Governor McNutt include (1) that road contractors buy their cement requirements and (2) further consideration of the desirability of a state owned cement plant.

◆ ◆ ◆

A RESOLUTION passed by the Iowa House of Representatives authorizes Fred White, chief engineer of the highway commission, to furnish all records and correspondence dealing with cement purchases for the three year period preceding November, 1931.

INTERNATIONAL CEMENT CORP., New York, N. Y., announces increase in hourly and weekly wages to employes at its mills in Pennsylvania, New York, Indiana and Kansas, coincident with an advance of 10 c. a bbl. in the price of cement.

## Lime

FLETCHER LIMESTONE CO., Fletcher, N. C., which has been producing crushed stone at its quarry there for about a year, is now enlarging its plant to provide for manufacture of lime. The new plant will have a capacity of 250 bu. of lime per 24 hr.

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GLENCOE Lime and Cement Co., St. Louis, Mo., announces a new masonry mortar, "Cobbsment." The cement is named after the late Col. C. W. F. Cobb, founder of this 52-yr. old business. This new cement is said to pass the Federal specification SS-W-101. It contains an integral waterproofing and is made of a lime base.

## Sand and Gravel

NEW JERSEY Sand and Gravel Producers' Association, Inc., has been organized to promote the use of New Jersey produced sand and gravel in construction of state highways. Officers of the association are Elmer Geran, president, Asbury Park; Michael C. Gallo, first vice-president, Netcong; Kenneth S. Kresslar, second vice-president, Carpentersville; Henry W. Peterson, third vice-president, Paulsboro; William A. Moore, secretary-treasurer.

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THE NEW JERSEY state highway commission has agreed to omit from the new county aid specifications a provision requiring that "in localities where a sufficient supply of suitable crushed stone can be readily obtained, the use of gravel, on account of its character or location, is not considered desirable."

◆ ◆ ◆

IN MISSOURI house bill No. 328 provides for a tax of 5% on the sale value of all lime, limestone, sand, gravel, marble, granite, sandstone, chat, and ores or concentrates mined or produced in Missouri. The Kansas City Chamber of Commerce is opposing this bill.

## Quarries

WILLIAM HEUMADER, whose crushing plant at St. Joseph, Mo., was destroyed by fire last April, announces his new plant with a daily capacity of 700 tons will soon be in operation. The plant is powered by two Diesel engines.

STEPPING into an entirely new field, the Standard Lime and Stone Co., Baltimore, Md., announces a line of rock wool insulating materials. An insulation division has been formed and Van Sant, Dugdale and Corner, Inc., Baltimore advertising agency, has been appointed to handle advertising for this division of the business. The material is manufactured and fabricated by the company and the line of materials include felted blankets for insulation of tanks, heating plants and industrial processing equipment, insulating cements, house insulation, and canvas covered, waterproofed, sections for insulation of both hot and cold pipe lines.

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A BILL has been introduced in the New York state Senate which would authorize construction of highway sidewalks of cinders, gravel or shale as relief work. Highway sidewalks would seem a desirable type of relief work, since they require little expenditure except a comparatively small amount for surfacing material and a great deal of labor. At the same time sidewalks flanking all of the important highways in the country would consume a considerable quantity of surfacing materials.

◆ ◆ ◆

## Phosphate

THE PROPOSAL of President Roosevelt bearing on development of the Muscle Shoals district has had a vitalizing effect on the Tennessee phosphate district. Three weeks ago rock bearing land was offered at ridiculously low prices. Today the prices which were asked are being turned down by owners and a general air of optimism predominates. Exports of phosphate from Tampa, Fla., in February represented the largest tonnage shipped from there since last June. Japan was the largest purchaser and Germany the second largest.

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## George E. Warren Elected Vice-President

GEORGE E. WARREN, widely known both within the cement industry and in highway and construction fields, has been elected vice-president and manager of eastern operations of the Southwestern Portland Cement Co. He is now located at Osborn, Ohio.

Mr. Warren received a degree in civil engineering from the University of Illinois in 1912, after which he spent three years in construction work. From 1915 to 1921 he was in the service department of the Universal Portland Cement Co. He was appointed assistant general manager of the Portland Cement Association in 1922. Since January, 1932 he has directed the work of the Association on the Coast.

# Digest of Foreign Literature

By F. O. Anderegg, Ph.D.
Consulting Specialist, Pittsburgh, Penn.

THE French journal, *Science et Industrie*, with the promised help of an impressive array of consulting editors, inaugurated this year a new edition devoted to the construction industry under the title *Construction et Traveaux Publics*. The first contribution coming from the pen of the eminent French engineer, E. Freyssinet, contains too much important material to receive adequate treatment in the space available for a digest. It should be translated completely and published by the American Concrete Institute.

**Novel Ideas and Views.** Today steel and concrete can be obtained having greatly increased unit strengths with practically no increase in cost. With these materials, the cost of unit strength is quite low, perhaps of the order of a third of the present price. But the deformations of standard reinforced concrete are such that its strength is almost independent of the strengths of the steel or of the concrete. E. Freyssinet has been devoting himself to overcoming these difficulties for some time and points out the price revolution which will follow their solution.

The first step is to make an analysis of the behavior of cements under loads in order to develop the fundamental laws of deformation in cement and to be able to develop control of them as desired. Then comes a theoretical and experimental study of reinforced concrete, giving special attention to the effect of internal tension so that the strength of the combination can be increased in proportion to that of its constituents. Finally he has developed methods of realizing these on a practical scale and is manufacturing at low cost reinforced concrete products of triple the usual strengths.

**Flow of Concrete Under Load.** Under the molecular forces involved, the cement aggregates itself into tiny units which Freyssinet calls corpuscles. As time passes and as the cement hardens, these grow, but in the interstitial spaces more dilute materials are present. When a load is applied, slippage occurs between these corpuscles and the cement is deformed. This movement results in increased volume, just as sand in motion occupies more volume than when quiescent. If some means is available to prevent the volume increase, the strength of the concrete may be greatly improved.

If, after the concrete is deformed, it is allowed to remain at rest, the molecules regroup themselves, just as they do during setting and hardening, and produce a self-healing; but where an indefinite repetition of alternating small forces acts on the concrete, the self-healing is prevented and fatigue results.

As concrete dries out, the moisture in capillaries is removed under definite thermodynamic laws and a shrinkage occurs which is proportional to its flow under exterior loads. It is also reversible. These deformations increase with time approaching a limit logarithmically, which is very slow with portland cement, but much more rapid with aluminous cement.

The shape of the intercorpuscular spaces and the size of the units have considerable practical importance. The void space effects determine both strength and deformability:

$$\text{Strength} = K \text{ Vol. Hdr. Cement}$$

$$\text{Deformability} = K\left(1 - \frac{\text{Vol. Free Water}}{\text{Vol. Hydr. Cement} + \text{Vol. Free Water}}\right)$$

On applying force to concrete during and after hardening, an elastic body is obtained similar to one having a ceramic bond. In those cements where the corpuscles are small, the interstices become smaller so that with a concrete of given strength, the more deformable, less fragile, they flow more slowly and are more durable, because the disintegrating agents have less opportunity of permeating through the paste. The portland cements have low solubility, small corpuscles and large plasticity, while aluminous cement has higher solubility, larger corpuscles and low deformability.

In ordinary reinforced concrete, the changes in volume following changes in moisture content result in the development of considerable internal strains, which cannot be relieved in ordinary concrete. By placing the concrete under strong compression, these strains are negligible.

If a steel of 125,000 lb. per sq. in. tensile strength and 110,000 lb. per sq. in. elastic limit is given a permanent load of 70,000, the above values reduce to 55,000 and 40,000, while the concrete itself of 11,200 lb. per sq. in. compressive and 840 tensile is changed to have 7000 compressive and the astonishing value of 5000 lb. tensile strength.

In concrete pipe manufacture, the steel is put under tension and fastened in place in the forms. A rich concrete made of high strength portland cement and carefully selected aggregates is made up to a consistency which is easily handled. A mandrel is placed in position surrounded with a distendable envelope. The concrete is poured with strong mechanical vibration, whereby a lot of water is removed. Then the mandrel envelope is given 225 lb. per sq. in. pressure and a lot more water is squeezed out. Of course, the form must be reinforced to withstand this handling. The mandrel is withdrawn immediately and used again. The molds are removed after 5 hours, but it is hoped to reduce this time. The pipe has perfect elasticity under considerable loads without evidence of creepage. The limiting factors are the elastic limit of the steel and the quality of the concrete.

Freyssinet has proposed to build a bridge joining the island of Oleron with the continent at a price that makes the capital outlay a good investment. Each member to be used is to be precast and tested at twice the load it is to carry.

He has also used his constrained concrete in making testing machines having very low movements themselves under load. One such machine has withstood repeatedly loads of 70,000 lb., whereas a similar machine made with ordinary reinforced concrete went completely to pieces, under a load of 27,000 lb.

**The Upper Lime Limit in Portland Cement.** Two series of burns have been made by Eberhard Spohn in the Technical Cement Institute of the Berlin Technical School. In the first, iron was absent and the three component raw mixes were chosen to give a series of points on the line joining $3CaO{\cdot}SiO_2$ and $3CaO{\cdot}Al_2O_3$. A temperature of 1460 deg. C. was chosen or 5 deg. above the quintuple point, which must be reached to secure complete sintering in iron-free portland cement. The heating time was one hour. While a more prolonged heating might allow the reaction to proceed further, even one hour is longer than the time of exposure of commercial portland cement clinker to this temperature. At the end of one hour, the clinker was cooled rapidly to freeze the equilibrium and the free lime was determined.

Correcting for the uncombined lime, the points of the different burns were found to fall on a line joining $3CaO{\cdot}SiO_2$ and the hypothetical $2CaO{\cdot}Al_2O_3$, until a sharp bending toward $3CaO{\cdot}Al_2O_3$ occurred as shown in Fig. 1. The explanation of the failure to approach closer to the theoretical limit involves the effect of the temperature on the reversible reaction

$$3CaO + SiO_2 \leftrightarrows 3CaO{\cdot}SiO_2.$$

When the mix is heated to 1455 the exothermic formation of tricalcium silicate and aluminate proceeds vigorously, raising the temperature. Then as the mix cools down slowly toward 1460 deg. more lime is taken in, but the time available in the rotary kiln puts an upper limit on the amount of lime which can be brought into combination. This

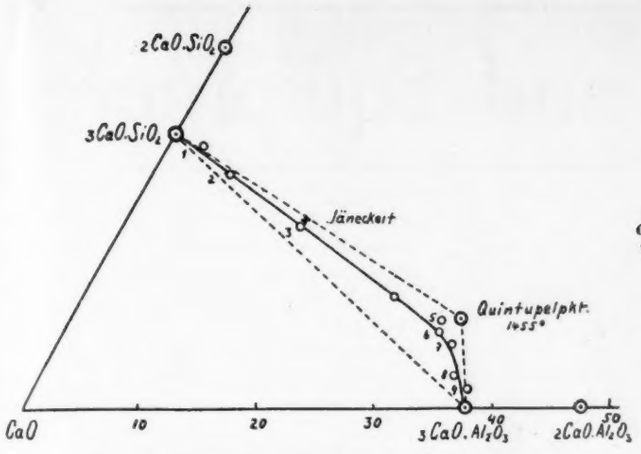



*Fig. 1. Upper lime limit in portland cement*

limit is always below that for the complete changing of all the silica to tri-silicate

In the second series iron and alumina, in equal molecular proportions, were both added to replace silica, stepwise. The lime content was such as to give 3 moles for each mole of silica and for each mole of alumina, while for each mole of iron oxide, two moles of lime were provided. The mix was heated for one hour at 1420 deg., or 5 deg. higher than the melting point of Brownmillerite, $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$.

On determining the free lime it was found that, except for the mix richest in silica, the other compositions all lay on a line joining $3CaO \cdot SiO_2$ and $4CaO \cdot Al_2O_3 \cdot Fe_2O_3$, indicating this compound to represent the upper limit of lime combination in the presence of 5% or more ferric oxide in portland cement. In these reaction products evidence was obtained of the fused iron compound and of the solids, free lime and tricalcium silicate. Only in high iron cements can one expect to get commercially a complete combination of the lime. When the possibility of variation in the raw mix, and of coarse particles, is combined with the incompleteness of reaction described here, it is unwise to try to bring the lime content too close to theoretical in practical burning.—*Zement* (1932) **21**, No. 50, pp. 704-706; No. 51, pp. 717-723; No. 52, pp. 731-736.

**Air Separator for Determining Fineness of Cement.** K. Miyazawa has developed an apparatus with which he can separate from a 50-gram sample of cement the part lying below 16 microns (0.00063 in.) in 30 minutes. This serves as a convenient method of aiding in the control of grinding high early strength cements, for which the information obtained from ordinary sieves is limited. Air from a suitable supply is dried with calcium chloride and maintained at constant pressure of 300 mm. of water by means of an outlet through a column of water. The air passes through a conical nozzle of 3 mm. diameter into the bend shown in Fig. 2 where it encounters the cement, keeping it constantly in motion. Fractionation takes place in a tube 15x150 cm. provided with a diverting cone and muslin catcher at the top.

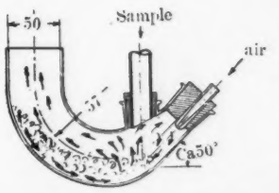



*Fig. 2 and 3. Showing air separator for cement*

The speed of separation depends upon the efficiency with which the air and cement are mixed and a special feeding device, shown in Fig. 3, has been developed to facilitate the mixing. Inside the sample feeder is an inner brass cylinder over the lower end of which is fastened a 600-mesh (per inch) sieve. This is vibrated vigorously by means of a suitable clapper. The cement should be first dried at 110 deg. C. The cement left in the feeder and in the bend is weighed.—*J. Soc. Chem. Ind. (Japan)* Suppl. Binding (1932) **35**, No. 12, pp. 553B-559B.

**Comment:** While this method gives helpful routine information, a more complete size distribution would be more valuable in predicting the rate of strength increase. Of the fraction separated in this apparatus, the finest particles contribute most to the 24-hour strength, while the coarser ones contribute more to the development of strength at 3 and 7 days. It has been found by the reviewer that best all around results are obtained when the grading of the cement is logarithmic, which means that the fractions in the several ranges, 5 to 10, 10 to 20 and 20 to 40 microns should be of equal weight. By using air at different pressures, it should be possible to separate at 10 microns in about 50 minutes, followed by separation at 20 microns in about 24 more minutes. The coarser separation may be obtained probably sufficiently close with the very fine sieve used in the feeder.

**Relation Between Setting Time and Heat Evolution of Cement.** Prof. A. Kleinlogel and Dr. K. Hajnai-Konyi discuss the usual specifications involving the Vicat or Gillmore needle and point out the lack of reproducibility in results among different laboratories is apt to follow from the arbitrary character of the test, in which the personal equation of the operator enters so markedly. They feel that the character of the heat evolution of portland cement, whether in neat pats or in concrete, would furnish more satisfactory information concerning the setting characteristics than do the needles in current use. In standardized apparatus, the rate of heat evolution should be capable of ready duplication.—*Zement* (1933) **22**, No. 1, pp. 2-7.

**Effect of Some Physical and Chemical Conditions in the Reactivity and Technical Properties of Roumanian Trass.** A. Steopoe of the Industrial Chemical Institute of Bucharest has extended his studies to include volcanic tufas from Dej and Slanic. Hydrated lime or lime set free from portland cement react, aided by moisture and higher temperatures and preconditioning of the trass material, to give improved strengths. The amount of silica that is brought into reaction is determined by treating with cold hydrochloric acid (Sp. gr. 1.12). Magnesium chloride and the sulfates of sodium and magnesium seemed to aid slightly the reaction and to help the strengths.—*Revue des Materiaux de Construction et de Travaux Publics* (1932), No. 279, pp. 493-496.

**Cement Strength Improved by Fine Admixtures.** Tosaku Yoshioka and Hiroo Iijima have been adding very finely ground admixtures to portland cement and determining the effect of the addition on the strength of 1:3 mortars. Working on the postulate that the results from the addition of chemically inert minerals "depend mostly on the absorption, by the additional materials, of the internal destructive force due to the hydro-expansion of cement grains during hardening," it was found that the addition of 20% by volume of carbon black, ferric oxide, Zettlitz kaolin, clays, talc, fullers or diatomaceous earths increased the 28-day strength. It was concluded that grains finer than 15 microns were chiefly responsible.—*J. Chem. Soc. Ind.* (Japan) Suppl. Binding (1932), **35**, No. 12, p. 563B.

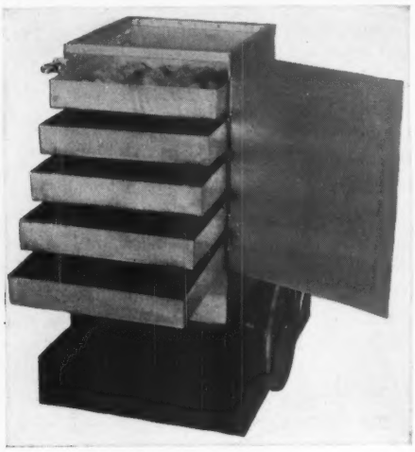
**Comment.** The Japanese use the Boehme hammer and earth-dry consistencies for testing cement and the addition of the fine powder would increase the amount of moisture available for hydrating the cement and also lubricate to permit better packing. If the consistencies had been plastic or even wetter, as they must be for most commercial uses, most of the admixtures would doubtless have caused a decrease in strength. However, in certain cements the lack of sufficient flour to produce the best packing may be advantageously supplied by suitable admixtures, with resulting improvement in strength. Rouge, diatomaceous earth and a few other pigments and siliceous admixtures have at times been found actually helpful by the reviewer, when added in small amounts. The effect discussed here is simply due to void filling and is independent of any pozzuolanic action.

# New Machinery and Equipment

## Testing Screens for Coarse Aggregate

A NEW TESTING SCREEN for coarse aggregate is announced by the Hendrick Manufacturing Co., Carbondale, Penn. This screen is designed for tests at plants of producing companies where testing must be quickly and thoroughly made and where testing sieves are readily accessible at any time.

Sieves of this screen are 18 in. square and this screen will take a 50 lb. sample of stone and screen it thoroughly in approximately



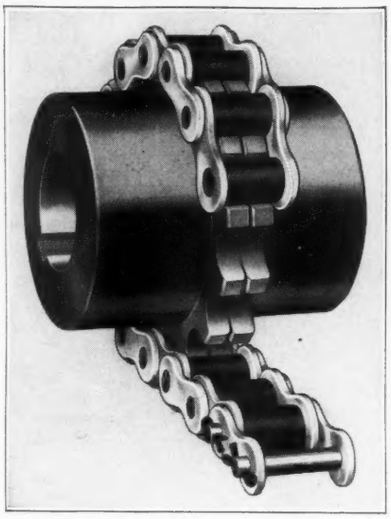
***Suitable for plant testing***

1½ to 2 min., the manufacturer states. Four bolts, one at each corner, hold the screen box on rubber shock absorbers by the compressive action of springs attached to the lower end of the bolts.

Two cams having high points set 180 deg. from each other are on a shaft mounted centrally beneath the box. As the shaft rotates the cams raise each side of the box alternately and drop it from the high point of the cam, a distance of ¼ in. As the box is moved up and down there is a slight motion back and forth in a horizontal plane, the combined motion giving an effective action.

## Flexible Coupling

THE Link-Belt Co., Chicago, Ill., announces a new flexible coupling in which the company's "RC" silver link roller chain will be used. The new coupling consists of two cut tooth sprocket wheels and a piece of roller chain to connect them, all working surfaces being machined to close tolerance. A pin and cotter length makes it easy to couple or remove the chain when desired. The coupling may be enclosed in either a stationary or revolving, automatically-lubricating, oil-retaining casing.



***Chain unites coupling***

## Walking Dragline

THE Bucyrus-Monighan Co. announces a new 10-yd. walking dragline with 150-ft. boom which is being sold by the Bucyrus-Erie Co., South Milwaukee, Wis. This new model is said to be the largest walking dragline ever built and combines the advantages of long reach and big bucket capacity with walking traction. The structure of this model, 10-W, is similar to other machines produced by the company, but is strengthened to meet the higher stresses required for such a large bucket on a long boom.

The operating cab has been elevated high up in the front right hand corner to give an unobstructed view of the bucket and the work. The walking traction shoes are raised above the ground while the machine is excavating, during which time it rests on an independent circular base of large area. The machine may be revolved while on this base to change direction of travel.

## Control Improvements on Excavators

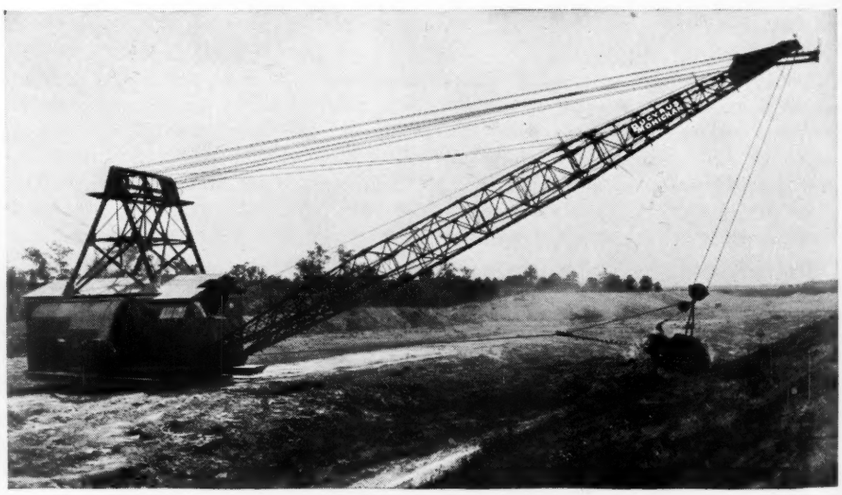
THE Harnischfeger Corp., Milwaukee, Wis., announces a line of excavators incorporating "split second" control. The old trip lever has been replaced by a small trigger attached to the hoist lever. Now the bucket is tripped with the little finger. "Super Smooth" swing clutches operate on the internal expanding band principle. Main clutches have been simplified and are built wider and heavier. A full-vision cab is provided. An upholstered leather seat is included. These excavators are finished in aluminum and green.

## Williamsport Is Granted License

WILLIAMSPORT Wire Rope Co., Chicago, Ill., has been added to the list of wire rope manufacturers licensed to manufacture "Preformed" wire rope under the American Cable Co. patents.

## Wire Rope Slings

THE MacWhyte Co., Kenosha, Wis., has issued a booklet on single and multiple-part wire rope slings and fittings which contains extensive data on type and capacities of slings.



***Suitable for large scale stripping***

# Coming Annual Meeting of the National Lime Association

## Opportunity of the Lime Industry Was Never Greater Than Now

THE Fifteenth Annual Meeting of the National Lime Association is scheduled to be held at the Ambassador Hotel in Atlantic City, N. J., Tuesday and Wednesday, the 23rd and 24th of May. A communication from the president, Norman G. Hough, states that while all members of the industry have been overburdened with difficulties arising as a result of the economic depression, nevertheless the association is about to bring to a close one of its most successful years.

### *Has Increased Use of Lime in Mortar*

The association has assumed a position of leadership in the masonry mortar field. Recommendations predicated on the results of research, broad field observation and careful analysis of the requirements for durable water-tight masonry indicate the necessity for the use of high lime content mortars. The story of lime and its part in conserving the tremendous investment in unit masonry construction has been carried to the architects, engineers and builders through a series of public meetings in various cities. As a direct result of these meetings, many architects have revised their specifications for mortar, requiring increased use of lime, which is reflected in a marked increase in the relative quantity of lime used per 1000 sq. ft. of floor area.

Building codes in several of the larger cities throughout the country have been revised to admit these higher quantities of lime. President Hough states that the leaking wall problem, which has become so annoying to builders and so expensive to the public, has been a large factor in reëstablishing lime in the mortar field.

### *Progress in Reëstablishing Lime Plaster*

He states also that much progress has been made looking towards the reëstablishment of lime plaster. The various departments of the Federal Government having charge of Federal construction are now specifying lime plaster for scratch and brown coats on a parity with competitive plaster. Live lime manufacturers are accepting this opportunity to sell lime during a time when tonnage in private building construction is at its present low ebb. Many post offices have been plastered with lime during the past year and because of the great saving per square yard of plastering, contractors are giving more and more thought to the use of this material during the days when competitive bidding for Government work is at its peak.

### *Lime in Sewage Treatment*

During the past two years the National Lime Association has been making a study of the various methods now in general use for the treatment of sewage and has noted the gradual trend in thought away from the existing biochemical methods and towards processes involving chemical precipitation with lime alone, or lime and other reagents.

The successful treatment of sewage at Dearborn, Mich., with lime, ferric chloride and paper pulp, coupled with the experimental work on lime precipitation now being conducted in Chicago and other places, and the activities of various equipment manufacturers in designing apparatus for the filtration of limed sludge, all indicate that the adoption of more modern and less costly treatment plants is a possibility in the near future. The present financial condition of most cities and municipalities demands that costs of new sewage treatment plants, as well as operating expenses of plants already installed, be reduced in proportion to the curtailment made in other municipal functions. This leads to consideration of lime consuming methods which are said to be capable of better control, more efficient and less costly than most present-day biochemical processes.

In view of the enormous potential tonnage (roughly estimated at one million tons annually) which will eventually fall into the lap of the lime industry if these newer sewage treatment processes prove successful and economical, it behooves every manufacturer of lime to devote serious thought to the possibilities of speeding up the capture of this lucrative business at a time when regular markets have shrunk almost to the vanishing point. An immediate substantial investment in the active promotion of all lime-using sewage treatment processes may quite possibly bring about unprecedented dividend returns in the way of new, steady, substantial and profitable tonnage.

### *Real Opportunities Within Grasp of Industry*

It is unfortunate, perhaps, that opportunities come to some industries at times when it seems hardest to raise funds to make the best of them, but it is better that opportunities come at times like these than not to come at all. A great opportunity awaits the lime industry in every branch of its distribution. A chance is offered to regain construction tonnage which has been lost to other industries in years gone by (part of which has been recovered during the past year) and, likewise, a great opportunity exists in the sewage treatment field.

There is hardly any phase of trade association work which does not directly or indirectly benefit every individual manufacturer of that industry, regardless of whether or not the individual producer is a member of his trade organization. This state of affairs is fortunate or unfortunate, depending upon which side of the fence the producer happens or chooses to be. However, no trade organization can survive indefinitely and continue effective work when the income derived from the investment made by the serious thinking, progressive members falls below a certain minimum amount. The "old faithful" cannot forever maintain an institution whose promotional and educational activities are capitalized upon with avidity by the "non-supporters," "hangers-on" and "free wheelers."

If ever there was a time in the history of the lime industry when it should stand together, it is through the period of the next two years when constructive work will be most effective. The National Lime Association needs the willing and earnest cooperation of every producer of lime and, what is equally true, the industry, both as a whole and as individuals, needs the type of work which can be accomplished only through a strong, well financed National Association.

Manufacturers large and small, members or non-members, should decide at once to attend the Annual Convention of the industry in Atlantic City and, after hearing the detailed plans for building new tonnage, should resolve to carry their fair and just share of the association investment necessary to bring about a speedy return to normal, profit-making business.

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## Publications of the Month

**Methods and Costs of Quarrying, Crushing and Grinding Limestone**—Information Circular 6608 describes methods and costs of quarrying, crushing and grinding limestone at the plant of the Southwestern Portland Cement Co., El Paso, Tex. Bureau of Mines, Washington, D. C.

**Method and Cost of Quarrying Limestone**—Information Circular 6610 contains data on method and cost of quarrying limestone at the plant of the Calaveras Cement Co., San Andreas, Calif. Cost tabulations represent operating expenditures only. Bureau of Mines, Washington, D. C.

**Growth and Development of the Nonmetallic Mineral Industries**—Information Circular 6687 contains brief history of activities of the nonmetallic industries as a group, followed by short histories of each of the more important commodities, noting circumstances that have influenced their developments. Bureau of Mines, Washington, D. C.

**Fifteenth Census—Construction Industry**—Summary of the construction industry of the United States in 1930 contains detailed statistics, by state, on various types of construction and materials consumed. Bureau of the Census, Washington, D. C.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

# Fireproof House Is Center of Interest of Concrete Masonry Association

THE ANNUAL MEETING of the Concrete Masonry Association evidenced the keen interest of the industry in the subject of the fireproof house market in particular. It also demonstrated the spirit of confidence and determination to make present circumstances work out to the advantage of the industry. Attendance was beyond expectations, in fact, better than for several years.

To suggest any one paper as outstanding would be unjust, as interest was sustained throughout all sessions. The papers are therefore briefly presented in order as given.

"How Concrete Masonry Manufacturers Can Use 'Facts About Concrete Masonry'" was presented for Einar Christensen by W. G. Kaiser. In this paper each section was reviewed, and possible applications of the data were suggested. Mr. Christensen urged every manufacturer of concrete masonry to study, to read this manual intelligently. In concluding his paper he said, "Let us learn how to sell our material—not as masonry units at so much a piece in the pile at the building site—but as parts of a completed system—a wall, or walls, in which we know how it will perform. We are able to do that now—for we have the necessary facts. The most pertinent are in this manual—if we are only able to read intelligently—and our own experience should form a valuable supplement.

"We must be able to tell about the safety of our completed wall—we must be able to tell about its other good features—comparing it wall for wall with competing masonry. Instead of thinking in terms of single square feet, we must sell in terms of the completed job.

"That is a fascinating story to tell—carrying step by step your concrete unit alongside of clay tile or clay brick into the completed wall—showing how your unit determines the quality of that wall, and how it makes definite economies possible," he said.

Henry A. Guthrie, Millar's Housing Letter, told how public opinion has been misled by various articles and general publicity regarding mass house construction methods. No plan has been completed by which low-cost mass house construction is possible, he said. Yet "propaganda" has had a definitely retarding effect on new projects, both by prospective builders and those who might finance them.

Mr. Guthrie urged concrete masonry manufacturers to improve their selling methods, pointed to the aggressive leadership of the Portland Cement Association in promoting this market, and emphasized that local publicity, cooperative work with local contractors, architects and financial institutions was vital for the early revival of home building.

"Concrete Ashlar—An Opportunity to Change Ideas" was the subject of a paper by R. N. McCandless, president, Cinder Units Corp., Detroit, Mich. The paper was read by Harry Shields, field engineer, Pennsylvania-Dixie Cement Corp. Mr. McCandless referred to random ashlar as opening a field "with unlimited possibilities, and one that increased our net income per unit in addition to increasing the volume of business."

The following list of types of construction was given as offering possibilities for this construction: Auditoriums; gymnasiums; corridors; class rooms; swimming pools; theatres; churches; store fronts; recreation rooms; recreation rooms in remodeled buildings; veneered residences; masonry residences; sales rooms; dance halls; road houses, and gasoline stations.

The character of concrete ashlar is so varied that unlimited combinations are possible and duplication is never necessary. Decoration can be obtained to retain all of the natural acoustical properties of units or, where outside exposure must be met, waterproof treatment that meets the most exacting requirements is possible. The combination of texture, mortar joint, pattern and color produces a beautiful and economical wall that can be adapted to any type of construction.

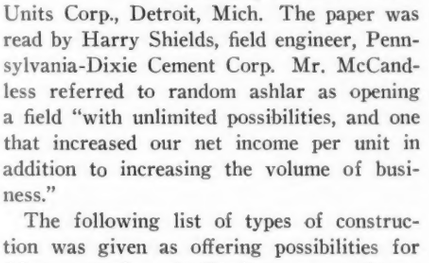



*Chart of "normal" compared with actual market*

The best selling argument is to show completed jobs. Every manufacturer should have several panels of concrete ashlar in his factory to illustrate several types of this work. These samples should always be painted.

Concrete ashlar not only increases profit per unit and volume of masonry sold, but also can result in sale of lintels, arches, trim blocks, and other specials, and it is possible to obtain good prices for these special units, he pointed out.

Most sensational was the paper by E. W. Dienhart, Portland Cement Association, "Pre-cast Floors—An Opportunity for Service as Well as Sales." Here is opportunity to develop an entirely new market for which a demand already exists. Pre-cast floors are not new, as various patents have been granted, dating back as far as 1898. The past design upon which fireproof concrete floors for homes had been based has provided for far greater loadings than are experienced. Form costs have been high with small monolithic jobs. Cost of concrete floors for homes have come to be considered much higher in cost than frame floor construction.

That it is possible to build fireproof floors that are adequately safe which can be sold at a cost comparative with wood joist construction has been shown in a number of instances in recent years. From the development of the past there are a number of ways in which these floors may be built, but the following suggestions were made in selection of the type of joist to be manufactured: The joist should be light in weight so that it may be easily placed on the job, easily handled in the factory, and so that it will add the minimum dead weight to the floor; the joist design should be attractive so as to present a pleasing appearance when left exposed; the joist should effect a satisfactory bond with the top slab in order to take advantage of the compressive strength of the slab; and provision should be made for the passage of service connections through the joist.

Manufacture of concrete joists may be carried out with little investment, where gang molds are used. Where markets justify, facilities for volume production should be installed. It was suggested that in introducing this product and type of construction a small investment in equipment would be preferable until some experience has been gained.

W. D. M. Allan, manager, cement products bureau, Portland Cement Association, then spoke on "The Fireproof Concrete Home—A Tremendous Market Ahead." This market is quickly seen from the accompanying illustration. He reported a survey by the Portland Cement Association which has established that high school and college graduates demand individualized homes; that the standardized, ready-made home has passed, except in villages and mining districts.

In reporting "What the Federal Government Has Ahead and Your Share in It," D. R. Collins, president, Concrete Masonry Association, who is now in Washington in the interest of members of the Association, reviewed the progress of the industry, technically, and told how data developed by the Association has been most helpful in developing respect and acceptance for concrete masonry from government officials. Many projects have been won for this material during recent months, and much of this business may be attributed to the established data in a clear, concise form.

Mr. Collins did not predict any definite amount of Federal construction in 1933-34. He did point to the Democratic preference of giving employment rather than direct relief, and expressed confident hope that this attitude would result in a substantial program of public works. Suggestions on how this business may be won included: Manufacturers should make a product that complies with the specifications, and be sure of it before submitting samples; don't knock the other fellow's product; give accurate information on your product; keep your representative in Washington posted at all time on status of project; contact jobs being designed by local architects; answer correspondence on projects promptly and accurately; write government officials promptly and send copies of all correspondence to Washington; and fight for the job on the basis of the completed job. In Washington the Association can assist you through contacts with those departments which are responsible for the material approved, eliminate delay which results through changing personnel, and maintain a healthy respect for concrete masonry by keeping necessary officials sold on its merits. The Association is not prepared to furnish quantity estimates, deliver samples or get approval for materials not meeting specifications.

The concluding paper by Ben Wilk, manager, Standard Building Products Co., Detroit, painted an exceedingly bright future for the industry.

Coming from Detroit, which has experienced a drop of 94% from the average construction volume over 15 years, there was more than ordinary encouragement in this picture. He was especially emphatic as to the importance of the work of the Concrete Masonry Association in raising the plane of the industry. Its program in developing and assembling extensive data has been most valuable, he pointed out. He illustrated the specific way in which the Association has helped win business on Federal construction.

Opportunities to win business were pointed out in the following fields: To get concrete masonry specified in all government buildings, at least as an alternate; to educate the public, architects, and products manufacturers themselves to the splendid results that can be obtained with concrete units above ground; to study the economy in using concrete units for low cost housing; to influence building codes to the proper recognition of concrete masonry; and to cooperate with others in developing specifications.

# THE INDUSTRY

## Incorporations

**Union Sand Co.**, Wichita, Kan. Capital $10,000.

**Magnolia State Portland Cement Co., Inc.**, Jackson, Miss. Capital 50,000 shares of no par value.

**Roquemore Gravel and Slag Co.**, Montgomery, Ala. Capital $10,000. J. D. Roquemore, Fred S. Ball, 1504 S. Perry Street.

**Louisville Mineral Products Co.**, Louisville, Ky. J. L. Marshall, 2245 Rutherford Lane, and W. G. Mosely.

**Central Stone Works**, High Point, Ga. Authorized capital $75,000. V. L. and O. W. Forrest and Walter E. Chrissman, incorporators.

**Newport Sand and Gravel Co.**, Newport, R. I. Capital stock 500 shares common no par value. Incorporators: Fred A. Otis, 1150 Lloyd Ave., Providence; John C. Knowles and Isador Korn.

**Kingston Trap Rock Co.**, Plainfield, N. J. Capital $100,000. To quarry stone. L. R. Gilbert and Irene L. Cullen. Caroline A. Dender, Elizabeth, N. J.

**Green Brothers Sand and Gravel Co.**, E. 91st St. between Ditmas and Avenue B, Brooklyn, N. Y. Bernard Green and Milton Green, incorporators.

**Silica Rock Asphalt Sales Corp.**, Ottawa, Ill. Capital $25,000. Incorporators: T. H. and P. R. Bellrose and W. E. McCleary of Ottawa, and H. B. Smith and S. R. Lewis of Marseilles. To manufacture and deal in asphalt products.

## Sand and Gravel

**Michigan City Core Sand Corp.**, Michigan City, Ind., has filed application for dissolution.

**Bridgeton Sand Co.**, Berlin, N. J., is arranging to move its plant to Newtonville.

**J. A. Farmer**, Stanford Park, Calif., has opened a rock and gravel business on property formerly occupied by William Urban.

**Pacific Building Materials Co.**, Portland, Ore., has asked permission to dig sand and gravel from the Willamette river.

**Pittsburgh Gravel Co.**, Pittsburgh, Penn., is building a barge on which it is installing a stone crusher.

**Elkhart, Kan.** The board of county commissioners is considering purchase of a sand pump to use in connection with obtaining road surfacing materials.

**Paul Oren**, Oxford, Mich., has been granted permission to build a railroad spur to the side of a proposed gravel plant. Construction of the gravel plant is expected to await improved industrial conditions.

**Iron City Sand and Gravel Co.**, Pittsburgh, Penn., experienced considerable trouble recently when high water in the Monongahela river swept its fleet of barges and towboats from their moorings. High water on the Ohio river has also caused other sand and gravel operators difficulty during recent weeks.

**Erie Sand and Gravel Co.**, Erie, Penn., is adding a 160-ton "Erie" batching bin for mixing the lake sand and gravel it produces. Addition to its dock to double present capacity is being considered to enable the company to handle crushed stone in quantities, as well as other commodities, since this is the only independent dock on the harbor front.

## Lime

**Farnam Cheshire Lime Co.**, Adams, Mass., has petitioned for dissolution.

**United States Gypsum Co.** expects its new wall board plant at Midland, Calif., to be completed and ready for use early in May.

**Orcas Island Lime Works**, near Olga, Wash., is opening a second ledge, as the accumulation of orders is reported to be beyond the former capacity of the plant.

**Ready Mixed Plaster Co.**, Wauwatosa, Wis., recently organized, is reported to have contracts assuring steady operations for at least three months.

## Gypsum

**Gypsum, Lime and Alabastine (Canada) Ltd.**, is completing arrangements for establishing a factory in England. Tentative plans call for erection of a plant about 30 mi. from London.

**Felton Holmes Lime Kiln**, Felton, Calif., has appointed W. E. Wechlo superintendent and is modernizing the plant. New machinery is being installed and improvements to the kiln are being made.

## Sand-Lime Brick

**Sand Lime Products Co.**, Detroit, Mich., has started legal action seeking dissolution of the corporation.

## Quarries

**Blue Ridge Lime and Stone Co.**, Fletcher, N. C., will resume operation at its quarry while safeguards for the future safety of its workmen are being installed.

**Glenn Morris, Carl McMillin** and **Dave Hudgens**, who operate a quarry near Deepwater, Mo., have purchased a new crusher and will install the machinery immediately.

**Central Rock and Sand Co.**, Kingsport, Tenn., has installed equipment for the manufacture of pulverized lime. More than $2,500 has been spent on new equipment.

## Cement

**North American Cement Corp.** resumed operation at its Catskill, N. Y., plant January 4 on a 65% basis.

**North American Cement Co.**, Albany, N. Y., has reopened its Howes Cave, N. Y., plant with a full force.

**Dewey Portland Cement Co.** renewed operations at its Dewey, Okla., plant early in January. The plant will operate at one-third capacity, it is reported, to stabilize employment.

**Monolith Portland Cement Co.**, Los Angeles, Calif., has reopened its plant after having been forced to close as a result of a flood some weeks ago.

## Trade Literature

**Vibrating Screens. Bulletin 133** describes features and advantages of the heavy-duty safety Jigger screens. PRODUCTIVE EQUIPMENT CORP., Chicago, Ill.

**Pulverizers and Crushers. Catalog 550** gives lengthy discussion of crushing problems and equipment to solve them. JEFFREY MANUFACTURING CO., Columbus, Ohio.

**Pulverizing Equipment.** "Looking Back at 1932" reviews Raymond pulverizing installations made in a variety of industries during 1932. RAYMOND BROS. IMPACT PULVERIZER CO., Chicago, Ill.

**Road Machinery.** 1933 catalog lists shovels and cranes, drags, dump wagons, crushing and washing plants, tractors and other road building equipment. AUSTIN-WESTERN ROAD MACHINERY CO., Chicago, Ill.

# LET'S FACE THE FACTS

● Lay-Set Preformed Wire Rope has been sold *on merit* of performance . . . necessarily so, because it is in a different price field than ordinary non-preformed rope.

Merit of performance is proved . . . certainly no excavating or construction contractor would continue to pay more for Lay-Set unless the service rendered was commensurate with its cost.

So here was the incentive to keep accurate records of Lay-Set performance . . . and as a result of these records of performance, Lay-Set Preformed Wire Rope sales have steadily grown in volume.

# INTERNAL STRESS IN WIRE ROPE IS COSTLY . . . AND INEXCUSABLE

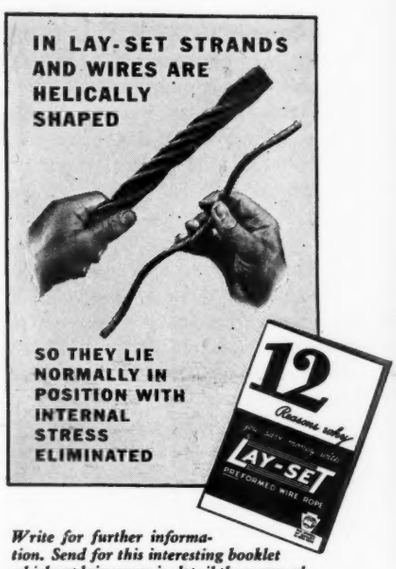
● How can 114 separate wires work in unison and resist fatigue in *non*-preformed wire rope—when each wire is under coil spring tension?

How can the strands of *non*-preformed wire rope carry balanced loads when the structure is unbalanced by this internal stress? Internal stress in *non*-preformed wire rope is a basic fault that is inexcusable.

Preforming strands and wires to their exact helical shapes eliminates internal stress. In LAY-SET Preformed Wire Rope, strands and wires lie naturally and fit perfectly in position. In work, every wire and strand carries its share of the load and does its share of the work—in teamwork with every other wire and strand.

That is why LAY-SET gives much greater service, longer wear and better efficiency. LAY-SET is more flexible, easier to handle and resists kinking. Because of the much greater service, LAY-SET is the *safest* wire rope to use for all excavating and construction work.

Face these facts when you order new cable . . . specify "LAY-SET" Preformed Wire Rope.


IN LAY-SET STRANDS AND WIRES ARE HELICALLY SHAPED
SO THEY LIE NORMALLY IN POSITION WITH INTERNAL STRESS ELIMINATED
12 Reasons why
LAY-SET
PREFORMED WIRE ROPE

*Write for further information. Send for this interesting booklet which explains more in detail the many advantages of Lay-Set Preformed Wire Rope.*

**HAZARD WIRE ROPE COMPANY**

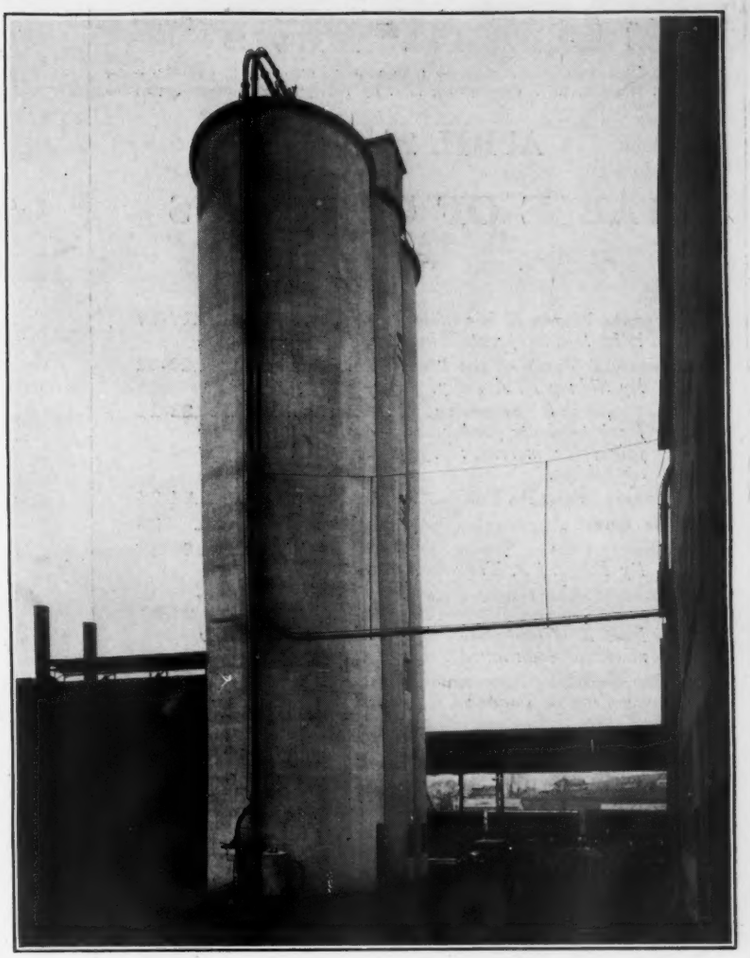
**WILKES-BARRE, PENNSYLVANIA**

New York Pittsburgh Chicago Denver Fort Worth Los Angeles
San Francisco Birmingham Philadelphia Tacoma

# SAVE BY SIMPLIFYING THE DISTRIBUTION OF MATERIALS

**A major improvement in the Fuller-Kinyon System, drastically reducing the cost of conveying pulverized materials*, was recently announced. Low pressure pumping has resulted in sharply decreased power consumption and even lower maintenance costs. The new Type "F" Fuller-Kinyon Pump, designed for low pressures, includes many mechanical improvements. It is adjustable while in operation and all parts are quickly accessible.**

Older types of Fuller-Kinyon Pumps can be adjusted at negligible expense to make substantially similar savings. If your pumps have not been modified for low pressure operation, write for full information.



THE simplicity with which complicated distribution problems can be solved is apparent in the conveying and blending system for dry cement raw materials, partly illustrated above. These conveyors operate and control the distribution of materials automatically, and function as a unit. The mill stream is conveyed from the air separators through a transport line having several changes in direction, and three separate elevations, a conveying distance of 400 feet, and elevations totalling 112 feet. The line passes over the kiln bins, where valves and branch lines provide for direct delivery, but the materials are normally delivered to the silos for blending purposes. The two storage silos were located to avoid interference with possible plant expansion. Two pumps, one below each silo, alternately circulate materials in synchronism with the mill stream, and convey to four kiln bins, in accordance with the Fuller or "layer" blending method. The blending cycle is automatic, but subject to remote control. Note that no structures are required to protect these conveyors from the weather, and that there are no elaborate supports.

***The following materials are commonly handled by Fuller-Kinyon Systems:**

ALUMINA
BAUXITE
CEMENT
CEMENT RAW MATERIALS
CHALK
CLAYS
COKE DUST
FELDSPAR
FLINT
FLUE DUSTS
FULLERS EARTH
GLUTEN FEED
GRAPHITE
GYPSUM
KAOLIN
LIME
LIMESTONE
MANGANESE DIOXIDE
PHOSPHATE ROCK
SODA ASH
SODIUM BICARBONATE
STARCH

*Our Engineering Department will gladly furnish estimates for complete systems for any of the above or equivalent materials.*

**Fuller Company**
CATASAUQUA, PENNA., U. S. A.

**Rotary Air Compressors . . . The Airveyor—a pneumatic conveyor**
**Rotary Feeders and Bin Gates . . . Bulk Cement Unloaders**

*Recognized the World Over as the Leader in Its Field*

# Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

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